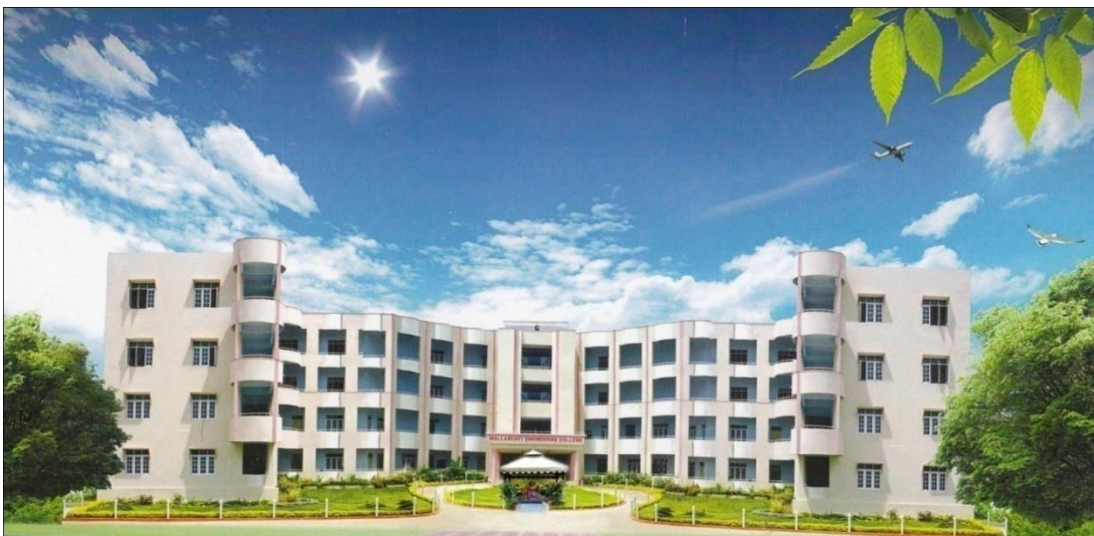# ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2018-19 onwards

Department of Computer Science and Engineering (CSE)

For
B.Tech. Four Year Degree Programme
(MR18 Regulations)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

(An UGC Autonomous Institution, Approved by AICTE and Affiliated to JNTUH, Hyderabad)
Recognized under section 2(f) &12 (B) of UGC Act 1956, Accredited by NAAC with 'A' Grade (II Cycle) and NBA
Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad - 500 100.
Website: www.mrec.ac.in   E-mail: principal@mrec.ac.in

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

MR18 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year *2018-19* onwards

The B.Tech. Degree of Jawaharlal Nehru Technological University Hyderabad, Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION

To establish a reputable professional education centre, to impart high quality trend setting technologies in an ambience of humanity, wisdom, intellect and innovation to nurture the students to become competent and committed professionals with disciplined ethical values.

MISSION

Commitment to progress in mining new knowledge by adopting cutting-edge technologies to promote academic growth by offering state-of-the-art undergraduate and postgraduate programmes based on well-versed perceptions of global areas of specialization to serve the nation with advanced technical knowledge.

DEPARTMENT VISION

Attaining global recognition in Computer Science and Engineering education, research and training to meet the growing needs of the industry and society.

DEPARTMENT MISSION

Quality education is imparted to develop innovative, entrepreneurial and efficient future professionals to fit in current global competitive environment.

State-of-art research facilities are provided to improve knowledge and develop technologies in the thrust areas of computer science and engineering.

Stake holders are allowed share their experiences in education and knowledge for mutual enrichment in the field of technical education.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Impart with a sound knowledge in scientific and engineering technologies necessary to formulate, analyze, design and implement solutions to computer science and engineering related problems.

PEO 2: Carry out research in frontier areas of computer science and engineering with the capacity to learn independently throughout life to develop new technologies.

PEO 3: Train to exhibit effective technical, communication and project management skills in their profession by following ethical practices.

PEO 4: Posses leadership and team working skills to become visionary, inspirational leaders and entrepreneurs.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1: Apply the knowledge gained during the course of the program from mathematics, basics Computing, Basic Sciences and all computer science courses in particular to identify, formulate and solve real life complex engineering problems faced in industries and /or during research work with due consideration for the public health and safety, in the context of cultural, societal, and environmental situations.

PSO 2: provide socially acceptable technical solutions to complex computer science engineering problem with the application of modern and appropriate techniques for sustainable development relevant to professional engineering practice.

PSO 3: Comprehend and write effective project in multi disciplinary environment in the context of changing technologies.

PROGRAMME OUTCOMES (POs)

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1. **Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T):** Malla Reddy Engineering College (Autonomous) (MREC-A) offers **Four** Year (**Eight** Semesters) **Bachelor of Technology** (**B.Tech**.) Under Graduate Programmes, under Choice Based Credit System (CBCS) in the following Branches of Engineering.

S. No.	Branch Code	Branch	Intake
1	01	Civil Engineering (CE)	180
2	02	Electrical and Electronics Engineering (EEE)	60
3	03	Mechanical Engineering (ME)	240
4	04	Electronics and Communication Engineering (ECE)	180
5	05	Computer Science and Engineering (CSE)	240
6	06	Information Technology (IT)	60
7	25	Mining Engineering (Mi.E)	60

2. Eligibility for Admission

2.1 Admission to the UGP shall be made either on the basis of the merit rank obtained by the qualifying candidate in entrance test conducted by the Telangana State Government (TSEAMCET), or the University, or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government of Telangana from time to time.

2.2 The medium of instructions for the entire UGP in E&T will be ENGLISH only.

3. B.Tech. Programme (UGP) Structure & Duration of Study

3.1 A student after securing admission shall pursue the Under Graduate Programme in B.Tech. in a minimum period of **four** academic years (8 semesters) and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester. Further 2 years of extension is allowed for appearing examinations, failing which student shall forfeit seat in B.Tech. Course. Each semester is structured to provide around 20 credits, totaling to 160 credits for the entire B.Tech. programme. Each student shall secure 160 credits (with CGPA ≥ 5) required for the completion of the Under Graduate Programme and award of the B.Tech. degree.

3.2 UGC/ AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are as listed below.

3.2.1 Semester Scheme:

Each Under graduate programme is of 4 academic years (8 Semesters), with the academic year being divided into two semesters of 22 weeks (≥90 instructional days) each, each semester having **'Continuous Internal Evaluation (CIE)'** and **'Semester End Examination (SEE)'**.Under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and Curriculum/ Course Structure as suggested by AICTE are followed.

3.2.2 Credit Courses:

All Subjects/ Courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) Structure, based on the following general pattern.

- One Credit - for one hour/ Week/ Semester for Theory/ Lecture (L) Courses/ Tutorials (T).
- One Credit - for two hours/ Week/ Semester for Laboratory/ Practical (P) Courses.

Courses like Environmental Sciences, Induction Programme, Gender Sensitization, Indian Constitution, Essence of Indian Traditional Knowledge and other student activities like Internship, Sports/Yoga and NSS are identified as Mandatory/Audit courses. These courses will not carry any credits.

3.2.3 Subject/ Course Classification:

All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The Institute has followed almost all the guidelines issued by AICTE/UGC/Affiliating University.

(a) Foundation Courses (FC)
(b) Core Courses (CC)
(c) Elective Courses (EC)
(d) Mandatory Courses (MC)
(e) Audit Courses (AC)

- **Foundation Courses (FC)** are further categorized as:
  (i) Humanities and Social Sciences including Management courses (HSMC)
  (ii) Basic Science Courses (BSC)
  (iii) Engineering Science Courses (ESC).
- **Core Courses (CC) and Elective Courses (EC)** are categorized as Professional Subjects (PS), which are further subdivided as –
  (i) Professional Core Courses(PCC)
  (ii) Professional Elective Courses(PEC)
  (iii) Open Elective Courses (OEC)
  (iv) Project (PROJ)
- **Mandatory Courses (MC** - Non-credit with evaluation).
- **Audit Courses (AC** – Non- credit without evaluation).

3.2.4 Course Nomenclature:

The curriculum nomenclature or course structure grouping for each of the UGP in E&T (B.Tech. Degree Programmes), is as listed below (along with AICTE specified range of total credits).

| Sl. No. | Classification | | Course Work – Subject Area | Distribution of credits | AICTE Suggested Breakup of Credits (Total 160) |
	AICTE	UGC			
1	HSMC		Humanities and Social sciences including Management courses.	11	12
2	BSC	Foundation Courses	Basic Sciences (BSC) including Mathematics, Physics, Chemistry and Biology.	21	25

3	ESC		Engineering Science Courses (ESC) including Engineering Workshop, Engineering Graphics, Basics of Electrical and Electronics / Mechanical / Computer Engineering.	39	24
4	PCC	Core Courses	Professional core Courses are relevant to the chosen specialization/branch; [May be split into Hard (no choice) and Soft (with choice)], if required.	47	48
5	PEC	Professional Electives	Professional electives are relevant to the chosen specialization/ branch.	18	18
6	OEC	Open Electives	Open electives are the courses from other technical and/or emerging subject areas.	9	18
7	PROJ	Project	Mini Project, Project and Seminar	15	15
8	MC	Mandatory Courses	These courses are non-credit courses with evaluation.	-	-
9	AC	Audit Courses	These courses are non-credit courses without evaluation.	-	-
Total credits for UGP (B.Tech.)					**160**

4.0 Course Registration

4.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him on the Under Graduate Programme (UGP), its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.

4.2 Academic section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work for the first semester through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE registration requests for any 'SUBSEQUENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'CURRENT SEMESTER'.

4.3 A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from the Faculty Advisor/Counselor, which should be submitted to the College Academic Section through the Head of Department (a copy of it being retained with Head of Department, Faculty Advisor/Counselor and the Student).

4.4 A Student may be permitted to register for the Subjects/ Course of CHOICE with a typical deviation of ±3 credits of the semester, based on his PROGRESS and SGPA/CGPA and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses in the department course structure and syllabus contents. It needs specific approval and signature of the Faculty Advisor/Counselor and Head of the Department, 'within a period of 15 days' from the beginning of the current semester.

4.5 If the student submits ambiguous choices or multiple options or erroneous entries during ON-LINE registration for the Subject(s) / Course(s) under a given specified Course/ Group/ Category as listed in the course structure, only the first mentioned Subject/ Course in that category will be taken into consideration.

4.6 Subject/ Course options exercised through ON-LINE registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for registration (by the Head of Department) in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that semester. Such changes are to be intimated to Chief Controller of Examinations/Principal immediately.

4.7 Open Electives: A student has to complete 3 Open Electives during the period of UGP. The students have to choose open electives from III year I semester onwards from the given list. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.8 Professional Electives: A student has to complete 6 Professional Electives during the period of UGP. Students have to choose professional electives from III year I semester onwards from the list of professional electives offered by their departments.

4.9 For Audit Courses like Sports/Yoga and NSS, MOOC/NPTEL online courses etc, a '**Satisfactory Participation Certificate**' from the authorities concerned for the relevant semester is essential. No Marks or Credits shall be awarded for these activities.

4.10 For Mandatory Courses, a '**Satisfactory / Not Satisfactory' grade** is awarded based on the performance in both CIE and SEE.

5.0 Subjects/ Courses to be offered

5.1 A typical Section (or Class) strength for each semester shall be 60.

5.2 A Subject/ Course may be offered to the students, ONLY IF a minimum of 40 students opt for the same. The maximum strength of a section is limited to 72.

5.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab / Practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on 'FIRST COME FIRST SERVE' basis and 'CGPA Criterion'(i.e., the first focus shall be on early ON-LINE ENTRY from the student for registration in that semester and the second focus, if needed, will be on CGPA of the student).

5.4 If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary actions, whether to offer such a Subject/ Course for TWO (or multiple) SECTIONS or NOT .

6.0 Attendance Requirements:

6.1 A student shall be eligible to appear for the Semester End Examinations, if he / she acquire a minimum of 75% of attendance in aggregate of all the Subjects/ Courses (including Non-Credit Courses) for that semester.

6.2 Condoning of shortage of attendance in aggregate up to 10%(>= 65% and < 75%) in each semester may be granted by the College Academic Committee (CAC) on genuine and **valid grounds** based on the student's representation with supporting evidence.

6.3 A stipulated fee prescribed by the CAC, shall be payable towards condoning of shortage of attendance.

6.4 Shortage of attendance below 65% in aggregate shall in NO case be condoned.

6.5 Students, whose shortage of attendance is not condoned in any semester, are not eligible to register their Semester End Examinations, they get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those Subjects registered in that Semester in which he got detained, by seeking re-admission for that semester as and when offered; in case if there are any Professional Electives and/ or Open Electives, the same may also be **re-registered** if offered, however, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

6.6 If any student fulfills the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7.0 Academic Requirements:

The following Academic Requirements have to be satisfied, in addition to the attendance requirements mentioned in item No.**6.**

7.1 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to each Subject/ Course, if he / she secures not less than 35% marks in the Semester End Examination and with a minimum of 40% of the total marks allocated for the course; in terms of Letter Grades, this implies securing 'P' Grade or above in that Subject/ Course. If the student secured 'F' grade in any subject he/she can apply for recounting / revaluation by paying prescribed fee. If the student is not satisfied after the results declaration of recounting / revaluation he/she can apply for challenge valuation with the prescribed fee. College appoints a faculty member; student can bring another faculty member who taught the respective subject at least once (proof should be provided). The faculty member should be from any autonomous college affiliated to JNTUH or JNTUH constituent colleges.

7.2 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to Mini Project/Technical Seminar/ Project, if he / she secure not less than 40% of the total marks to be awarded for each. The student would be treated as failed, if he (i) does not submit a report on his / her Mini Project / Technical Seminar / Project or does not make a presentation of the same before the Evaluation Committee as per schedule or (ii) secures less than 40% of marks in industry oriented Mini Project/ Technical Seminar/ Project evaluations.

He / She may reappear once for each of the above evaluations, when they are scheduled again; if he / she fails in such **'one-reappearance'** evaluation also, he / she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules: Every student has to fulfil the Attendance and Academic requirements by securing the required credits against registered credits as shown below:

S. No.	Promotion	Conditions to be fulfilled
1.	First year first semester (I Semester) to first year second semester (II Semester)	• Regular course of study of first year first semester. (I Semester)
2.	First year second semester (II Semester) to second year first semester (III Semester)	• Regular course of study of first year second semester (II Semester). • Must have secured at least 50% credits up to first year second semester (II Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester (III Semester) to second year second semester (IV Semester)	• Regular course of study of second year first semester (III Semester)
4.	Second year second semester (IV Semester) to third year first semester (V Semester)	• Regular course of study of second year second semester (IV Semester). • Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5.	Third year first semester (V Semester) to third year second semester (VI Semester)	• Regular course of study of third year first semester (V Semester).

6.	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	- Regular course of study of third year second semester (VI Semester). - Must have secured at least 60% credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7.	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	Regular course of study of fourth year first semester (VII Semester).

7.4 A Student shall register for all subjects covering 160 credits as specified and listed (with the relevant Course/ Subject Classifications as mentioned) in the Course Structure, fulfils all the Attendance and Academic requirements for 160 credits securing a minimum of 'P' Grade (Pass Grade) or above in each subject and earn 160 credits securing SGPA ≥ 5.0 (in each semester) and CGPA (at the end of each successive semester) ≥ 5.0, to successfully complete the UGP.

7.5 After securing the necessary 160 credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective/open electives subjects for optional drop out from these 160 credits earned; resulting in 154 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 154 credits shall alone be taken into account for the calculation of the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account) and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

7.6 If a student registers for some more **'Extra Subjects'** (in the parent Department or other Departments/ Branches of Engineering) other than those listed subjects totaling to 160 credits as specified in the Course Structure of his / her department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 160 credits) will not be taken into account while calculating the SGPA and CGPA. For such extra subjects registered, Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items No.6 and 7.1 to7.5.

7.7 When a student is detained due to shortage of attendance in any semester, he / she may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements. The academic regulations under which student has been readmitted shall be applicable. However, no Grade Allotments or

SGPA/ CGPA calculations will be done for that entire semester in which he / she got detained.

7.8 When a student is detained due to lack of credits in any year, shall be promoted to the next academic year only after acquiring the required academic credits. The academic regulations under which student has been readmitted shall be applicable to him.

7.9 A student eligible to appear in the Semester End Examination in any Subject/ Course, but absent from it or failed (thereby failing to secure 'P' Grade or above) may reappear for that Subject/ Course at the supplementary examination as and when conducted. In such cases, his / her Internal Marks (CIE) assessed earlier for that Subject/ Course will be carried over and added to the marks to be obtained in the SEE supplementary examination, for evaluating his / her performance in that subject.

8.0 Evaluation, Distribution and Weightage of Marks

8.1.1 The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned) for 100 marks for Theory, Practicals, Seminar, Drawing / Design, Minor Project, Major Project and Minor Courses etc.,. The Theory / Practical courses are evaluated with two components. 1. Continuous Internal Evaluation (CIE), 2. Semester End Examination (SEE). The distribution of 30 Marks for CIE and 70 Marks for SEE decided in the Academic Council.

8.2 Theory Courses:

8.2.1 Continuous Internal Evaluation (CIE):
CIE shall be carried out for all courses of UG Programmes twice in a semester (2 Midterm examinations) with the help of objective evaluation, subjective evaluation, regular assignments and Attendance. Each mid term examination shall consist of objective test with a duration of 20 minutes, subjective paper shall be conducted with a duration of 90 minutes and one assignment. The composition of objective test, subjective test, assignment and attendance shall be evaluated for 40%, 40%, 10% and 10% of the allocated internal marks.

Mid - Term Examination - UG				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Multiple – Choice Questions	20	1	20
Part - B	Choice questions (4 out of 6)	4	5	20
Mid Term Exam Total				40
Assignment				5
Attendance				5
Grand Total				**50**

*The CIE will be conducted for 50 marks and scaled to 30 marks.

The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus. First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second midterm examinations. The subject wise attendance of each spell of instruction should be considered for the allocation of marks for attendance before each midterm examinations.

Percentage of Attendance	Marks
>90 and ≤100	5
>85 and ≤90	4
>80 and ≤85	3
>78 and ≤80	2
>75 and ≤78	1

The weightage for the midterm examination shall be given as 70% of the best performing midterm examination and 30% of the other midterm examination. The student shall appear for both midterm examinations, in case of any specific reason the student appears only one midterm examination, 70% weightage of that examination shall be considered.

8.2.2 Semester End Examination (SEE):

Semester End Examination (SEE) shall be conducted for all courses of UG Programmes at the end of the Semester. Duration of the examination is 3 hours. The paper setting and evaluation of all courses carried out by external examiners. The examiners will be selected by the Chief Controller of Examinations/Principal, from the panel of examiners submitted by the head of the respective department.

Semester End Examination - UG			
Type of Questions	No. of Questions	Marks per Question	Total
Choice Questions: For each question there will be an 'either or choice', which means that there will be two questions from each module and the student should answer either of the two questions.	5	14	70

8.3 Practical Courses:

8.3.1 Continuous Internal Evaluation (CIE):

CIE marks shall be awarded with a distribution of 40% for day - to-day performance and timely submission of lab records, 40% for internal lab exam (best out of two exams) and 20% for viva-voce.The CIE will be conducted for 50 marks and scaled to 30 marks.

8.3.2 Semester End Examination (SEE):

SEE marks shall be awarded with a distribution of 20% for design/procedure/schematic diagram of the given experiment, 40% for conduction of experiment, 20% for results and 20% for viva-voce. For conducting SEE (with duration of 3hours), one internal examiner and one

external examiner will be appointed by the Chief Controller of Examinations/Principal of the college. The external examiner should be selected from the outside college among the autonomous/reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

8.4 Engineering Graphics:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Engineering Graphics				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Day – to – Day Work			20
Mid – Term Examination				
Part - B	Choice questions (4 out of 6)	4	7.5	30
Total				50

*The CIE will be conducted for 50 marks and scaled to 30 marks.

The distribution of marks for SEE is given below

SEE for Engineering Graphics			
Type of Questions	No. of Questions	Marks per Question	Total
Either or Choice from Each Module	5	14	70

8.5 Machine Drawing:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Machine Drawing			
Type of Questions	No. of Questions	Marks per Question	Total
Day to Day Work			20
I Mid Term Examination			
Part Drawing (4 out of 6)	4	7.5	30
II Mid Term Examination			
Assembly Drawing (1 out of 2)	1	30	30
Total			50

*The CIE will be conducted for 50 marks and scaled to 30 marks.
The distribution of marks for SEE is given below

SEE for Machine Drawing			
Type of Questions	No. of Questions	Marks per Question	Total
Part A - Part Drawing (2 out of 4)	2	15	30
Part B - Assembly Drawing (Compulsory Question)	1	40	40
Total			70

8.6 Projects:

8.6.1 Internship-III/Mini Project:

There shall be an Internship-III/Mini Project, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester (VI Semester) end examinations and pursue it during summer vacation. The evaluation of Mini project will be done at the end of IV Year I semester (VII semester). It shall be evaluated internally for 100 marks. The committee consisting Project Coordinator, Supervisor of the project and one senior faculty of the department will evaluate the mini Project and award appropriate Grade, based on the report submitted to the department and presentation provided by the student in front of the committee.

8.6.2 Project:

UG project work shall be carried out in two stages: Project Stage – I shall be evaluated internally during IV Year I Semester, Project Stage – II shall be evaluated externally during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

8.6.2 **(a)** For Project Stage – I, the departmental committee consisting of Head of the Department,
project supervisor and a senior faculty member shall evaluate the project work for 70 marks and project supervisor shall evaluate for 30 marks. Two reviews shall be conducted. Review-I will be conducted within a month from the commencement of class work (problem definition, objective, literature survey) and Review-II will be conducted before second mid examination (brief description and sample case study, progress of work, presentation and report submission). Average of the two reviews will be taken for 100 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the subsequent semesters, as and when it is scheduled.
The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another.

8.6.2 (b) Project Stage – II is the continuation of Project Stage – I. It shall be evaluated by the external examiner for 70 marks and the project supervisor shall evaluate it for 30 marks.Two reviews should be conducted. Review-I will be conducted within a month from the commencement of class work (progress of work, discussion and presentation) and Review-II will be conducted before second mid examination (progress of work, results, discussion, presentation and report submission). Average of the two reviews will be taken for CIE. The Project Viva-voce (SEE) shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. In SEE marks, 20% for working model/ simulation/data collection, 20% for report preparation and 60% for presentation and viva-voce.The external examiner should be selected by Chief Controller of Examinations/Principal from outside the college among the autonomous/reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

8.7 Seminar:

For Seminar presentation, the student shall collect the information on a specialized topic, prepare a Technical Report and submit to the department at the time of seminar presentation. The seminar presentation (along with the technical report) shall be evaluated by a committee consisting of Seminar coordinator and two senior faculty members with appropriate grade. The seminar report shall be evaluated internally for 100 marks. There shall be no semester end examination for the seminar.

8.8 Non-Credit Courses:

8.8.2 Mandatory Courses:

Mandatory Non-Credit Courses offered in any semester, a 'Satisfactory / Not Satisfactory' shall be awarded to the student based on the performance in both CIE and SEE.

8.8.3 Audit Courses:

Audit Courses offered in any Semester, a '**Satisfactory Participation Certificate**' shall be issued to the student from the concerned authorities, only after securing $\geq 65\%$ attendance in such a course. Internship program is also conducted under the category of Audit Courses. The student needs to submit a detailed report to the department after internship program. No marks or Letter Grade shall be allotted for these activities.

9 Grading Procedure

9.1 Grades will be awarded to indicate the performance of each student in each theory subject, or Lab/ Practical or Seminar or Project or Mini-Project or Minor

Course etc., based on the % of marks obtained in CIE + SEE both taken together as specified in Item No. 9 and a corresponding Letter Grade shall be given.

9.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

% of Marks	Grade Points	Letter Grade
≥90	10	(Out Standing)
≥80 to < 90	9	A$^+$ (Excellent)
≥70 to < 80	8	A (Very Good)
≥60 to < 70	7	B$^+$ (Good)
≥50 to <60	6	B (Average)
≥40 to < 50	5	C(Pass)
< 40	0	F (Fail)
Absent	0	Ab

9.3 A student obtaining 'F' Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE) as and when conducted. In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier.

9.4 A Letter Grade does not imply any specific % of marks.

9.5 In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA / CGPA Improvement'. However, he / she has to repeat all the Subjects/ Courses pertaining to that semester, when he / she is detained (as listed in Items Nos.7.7 &7.8).

9.6 A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses).Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with credits for that particular Subject/ Course.
Credit Points (CP) = Grade Point (GP) x Credits …For a Course

9.7 The Student passes the Subject/ Course only when he / she gets GP ≥ 5('C' Grade or above).

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/ Courses registered in a semester by the Total Number of Credits registered during that semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$SGPA = \left\{ \sum_{i=1}^{N} C_i G_i \right\} / \left\{ \sum_{i=1}^{N} C_i \right\}$ … for each semester

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the number of Subjects 'REGISTERED' for the semester (as specifically required and listed under the Course Structure of the parent Department) is the number of credits allotted to the ith subject and represents the Grade Points (GP)corresponding to the Letter Grade awarded for that ith subject.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a

student in ALL registered courses in ALL semesters and the total number of credits registered in ALL the semesters. CGPA is rounded off to TWO decimal places. CGPA is thus computed from the II semester onwards, at the end of each semester, as per the formula.

$$CGPA = \left\{ \sum_{j=1}^{M} C_j G_j \right\} / \left\{ \sum_{j=1}^{M} C_j \right\} \dots \text{ for all 'S' semesters registered}$$

(i.e., up to and inclusive of 'S' semesters, $S \geq 2$)

where 'M' is the TOTAL number of subjects (as specifically required and listed under the course structure of the parent department) the student has 'REGISTERED' from the 1st Semester onwards up to and inclusive of the semester 'S' (obviously M > N), 'j' is the subject indicator index (takes in to account all subjects from '1' to 'S' semesters) is the number of credits allotted to the jth subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j^{th} subject. After registration and completion of I Year I Semester however, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

ILLUSTRATION OF CALCULATION OF SGPA

Course/ Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	3	A	8	3 x 8 = 24
Course 2	3	O	10	3 x 10 = 30
Course 3	3	C	5	3 x 5 = 15
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	1.5	B	6	1.5 x 6 = 09
Course 7	1.5	A	8	1.5 x 8 = 12
Course 8	2	A	8	2 x 8 = 16
	Total = 20			Total Credit Points = 151

SGPA = 151/20 = 7.55

ILLUSTRATION OF CALCULATION OF CGPA:

Semester	Credits	SGPA	Credits X SGPA
Semester I	18	7	18 X 7 = 126
Semester II	20	6	20 X 6 = 120
Semester III	20	6.5	20 X 6.5 = 130
Semester IV	20	6	20 X6 = 120
Semester V	21	5.75	21 X 5.75 = 120.75
Semester VI	20	7.25	20 X 7.25 = 145
Semester VII	21	8	21 X 8 = 168
Semester VIII	20	8.5	20 X 8.5 = 170
	160		1099.75

CGPA = 1099.75/160 = 6.87

9.10 For merit ranking or comparison purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

9.11 For calculations listed in Item Nos.9.6 to 9.10, performance in failed Subjects/ Courses (securing 'F' Grade) will also be taken into account and the credits of

such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

9.12 Passing Standards:

9.12.2 A student shall be declared successful or 'passed' in a semester, only when he / she gets a SGPA ≥ 5.00 (at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire UGP, only when he / she gets a CGPA ≥ 5.00; subject to the condition that he / she secures a GP ≥ 5 ('C' Grade or above) in every registered Subject/ Course in each semester (during the entire UGP) for the degree award, as required.

9.12.3 Inspite of securing 'P' Grade or above in some (or all)Subjects/ Courses in any semester, if a student receives a SGPA < 5.00 and/ or CGPA < 5.00 at the end of such a semester, then he / she 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) (i) to go into the next subsequent semester (subject to fulfilling all other attendance and academic requirements as listed under Items Nos. 7&8);(ii) to 'improve his / her SGPA of such a semester (and hence CGPA) to 5.00 or above', by reappearing for ONE or MORE (as per student's choice) of the same course(s) in which he / she has secured 'P' Grade(s) in that semester, at the Supplementary Examinations to be held in the next subsequent semester(s). In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

9.12.4 A student shall be declared successful in any Non-Credit Course, if he / she secures a 'Satisfactory Participation Certificate' for that Audit Course and "Satisfactory Grade' for Mandatory Course.

9.13 After the completion of each semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits and Grade Earned etc.), Credits earned, SGPA and CGPA.

10   Declaration of Results

10.1 Computation of SGPA and CGPA are done using the procedure listed in items 9.6 to 9.10.

10.2 For final % of marks equivalent to the computed final CGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

11   Award of Degree

11.1 A student who register for all the specified courses as listed in the Course Structure, satisfies all the course requirements, passes all the examinations prescribed in the entire UG Programme (UGP) within the specified period (refer 4.1) and secures the required 160 Credits (with CGPA ≥ 5.0) shall be declared to have 'QUALIFIED' for the award of the B.Tech. Degree in the chosen branch of engineering as selected at the time of admission.

11.2 A student who qualifies for the award of the degree as listed in Item 11.1, shall be placed in the following classes:

Class Awarded	CGPA
First Class with Distinction	≥ 8.00
First Class	≥ 6.50 and < 8.00
Second Class	≥ 5.50 and < 6.50
Pass Class	≥ 5.00 and < 5.50

11.3 A student with final CGPA (at the end of the UGP) <5.00 will not be eligible for the award of the degree.

11.4 Students will be eligible for the award of '**Gold Medal**', if he/she should have passed all the subjects/courses in first appearance within the first academic years (or eight sequential semesters) from the date of commencement of first year first semester and should have secure CGPA ≥ 8.00 at the end of eight sequential semesters.

11.5 A student will be eligible to get under graduate with honours or additional minor engineering if he/she completes an additional 20 credits through MOOCs.

12   Withholding of Results

If the student has not paid fees to college at any stage or has pending dues against his / her name due to any reason whatsoever or if any case of indiscipline is pending against him, the result of the student may be with held and he / she will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

13   Transitory Regulations

A. **For students detained due to shortage of attendance**:

1. A student who has been detained in I year of MR14/ MR15/ MR17 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR18 regulations and he / she is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.

2. A student who has been detained in any semester of II, III and IV years of MR14/ MR15 regulations for want of attendance shall be permitted to join the corresponding semester of MR18 regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The MR18 academic regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further transitory regulations.

B. **For students detained due to shortage of credits**:

3 A student of MR14/ MR15 (2015-16 and 2016-17 admitted students)/ MR 17 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR18 regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The MR18 academic regulations are applicable to a student from the year of readmission onwards. See rule (C) for further Transitory Regulations.

C. **For readmitted students in MR 18 regulations**:

4 A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

5 The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including MR18 regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are ≤ 206, three subjects if total credits acquired are > 206 (see MR18 regulations for exemption details).

6 If a student readmitted to MR18 regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in MR18 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).

   Note: If a student readmitted to MR18 regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in MR18 regulations, the departments concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

14 Student Transfers

14.1 There shall be no branch transfers after the completion of admission process.

14.2 The students seeking transfer to MALLA REDDY ENGINEERING COLLEGE (Autonomous)-MREC(A) from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of MREC(A) and also pass the subjects of MREC(A) which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of MREC(A), the students have to study those subjects in MREC(A) inspite of the fact that those subjects are repeated.

14.3 The transfer students from other Universities / Institutions to MREC(A) who are on rolls will be provided one chance to write internal examinations in the failed subjects and/or subjects not studied as per the clearance letter issued by the JNTUH.

15 Scope

(i) Where the words "he", "him", "his", occur in the write – up of regulations, they include "she", "her", "hers".

(ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".

(iii) The academic regulations should be read as a whole, for the purpose of any interpretation.

(iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee headed by the Principal is final.

Academic Regulations for B.Tech.(Lateral Entry Scheme) w.e.f the A Y 2019-20

1. **Eligibility for award of B. Tech. Degree(LES)**

   The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 122 credits and secure 122 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the 122 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 114 credits for B.Tech. programme performance evaluation**.**

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4. The attendance requirements of B. Tech. (Regular) shall   be applicable to B.Tech.(LES).

5. **Promotion Rule:**

Sl.No.	Promotion	Conditions to be fulfilled
1	Second year first semester (III Semester) to second year second semester (IV Semester)	Regular course of study of second year first semester (III Semester).
2	Second year second semester (IV Semester) to third year first semester (V Semester).	**(i)** Regular course of study of second year second semester (IV Semester) **(ii)** Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the
3	Third year first semester (V Semester) to third year second semester (VI Semester)	Regular course of study of third year first semester (V Semester).
4	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	**(i)** Regular course of study of third year second semester (VI Semester) **(ii)** Must have secured at least 60% credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	Regular course of study of fourth year first semester (VII Semester)

6.   All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

Sl.No.	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to that course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that semester. The hall ticket of the candidate shall be cancelled.
3	Impersonates any other candidate in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of

		the original student who has been impersonated, shall be cancelled in all the courses of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The student is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Controller of Examinations (CCE) / Controller of Examinations (CE) / Assistant Controller of Examinations (ACE) / any officer on duty or misbehaves or creates	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining

	disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination	examinations of the courses of that semester. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police cases registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the student is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in

		that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the student has appeared including practical examinations and project work of that SEE.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the CCE for further action toward suitable punishment.	

Note: *The student(s) found indulging in malpractices during the CIE also will be punished based on the recommendations of the College Academic Committee.*

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

COURSE STRUCTURE - B.Tech. COMPUTER SCIENCE AND ENGINEERING

(Choice Based Credit System)

(MR18 Regulations – Effective from Academic Year 2018-19 onwards)

S.No	Category	Course Code	Course Title	L	T	P	Credits
I SEMESTER							
1	-	-	Induction programme	-	-	-	-
2	HSMC	80H01	English	3	-	-	3
3	BSC	80B01	Engineering Mathematics - I	3	1	-	4
4	BSC	80B02	Applied Physics	3	1	-	4
5	ESC	80501	Programming for Problem Solving	3	-	-	3
6	HSMC	80H02	English Language Lab	-	-	2	1
7	BSC	80B04	Applied Physics Lab	-	-	2	1
8	ESC	80502	Programming for Problem Solving Lab	-	-	2	1
9	ESC	80303	Engineering Workshop	-	-	2	1
			Total	12	2	8	18
			Total Contact Hours : 22				

S.No	Category	Course Code	Course Title	L	T	P	Credits
II SEMESTER							
1	BSC	80B06	Engineering Mathematics - II	3	1	-	4
2	BSC	80B03	Engineering Chemistry	3	1	-	4
3	ESC	80201	Basic Electrical and Electronics Engineering	3	-	-	3
4	ESC	80503	Data Structures	3	-	-	3
5	ESC	80301	Engineering Graphics	1	-	2	2
6	BSC	80B05	Engineering Chemistry Lab	-	-	2	1
7	ESC	80202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
8	ESC	80504	Data Structures Lab	-	-	2	1
9	ESC	80302	Engineering Graphics Lab	-	-	2	1
10	AC	80A01	NSS/SPORTS/YOGA	-	-	3	-
			Total	13	2	13	20
			Total Contact Hours : 28				

			III SEMESTER				
S.No	Category	Course Code	Course Title	L	T	P	Credits
1	BSC	80B09	Probability and Statistics	3	-	-	3
2	PCC	80505	Discrete Mathematics	3	-	-	3
3	PCC	80506	Computer Organization	3	-	-	3
4	PCC	80507	Operating Systems	3	-	-	3
5	PCC	80508	Java Programming	3	-	-	3
6	ESC	80601	IT Workshop	-	-	2	1
7	PCC	80509	Operating Systems Lab	-	1	2	2
8	PCC	80510	Java Programming Lab	-	1	2	2
9	MC	80M02	Gender Sensitization	2	-	-	-
10	AC	80A02	Internship - I	-	-	-	-
			Total	17	2	6	20
			Total Contact Hours : 25				

			IV SEMESTER				
S.No	Category	Course Code	Course Title	L	T	P	Credits
1	PCC	80511	Software Engineering	3	-	-	3
2	PCC	80512	Database Management Systems	3	-	-	3
3	ESC	80602	Web Technologies	3	-	-	3
4	PCC	80513	Formal Languages and Automata Theory	3	-	-	3
			Professional Elective –I				
5	PEC-I	80523	Object Oriented Analysis and Design	3	-	-	3
		80524	Neural Networks				
		80525	Computer Graphics				
6	PCC	80514	Software Engineering & UML Lab	-	1	2	2
7	PCC	80515	Database Management Systems Lab	-	1	2	2
8	ESC	80603	Web Technologies Lab	-	1	2	2
9	MC	80M01	Environmental Science	2	-	-	-
			Total	17	3	6	21
			Total Contact Hours : 26				

			V SEMESTER				
S.No	Category	Course Code	Course Title	L	T	P	Credits
1	HSMC	80H05	Management Fundamentals	3	-	-	3
2	PCC	80516	Compiler Design	3	-	-	3
3	PCC	80517	Computer Networks	3	-	-	3
			Professional Elective –II				
4	PEC-II	80526	Advanced Databases	3	-	-	3
		80617	Artificial Intelligence				
		80527	Animation Techniques				
			Professional Elective –III				
5	PEC-III	80528	Distributed Systems	3	-	-	3
		80529	Image Processing				
		80530	Semantic Web				
6	PCC	80518	Compiler Design Lab	-	1	2	2
7	PCC	80519	Computer Networks Lab	-	1	2	2
8	ESC	80610	Python Programming Lab	-	1	2	2
9	MC	80M04	Indian Constitution	2	-	-	-
10	AC	80A03	Internship – II	-	-	-	-
			Total	17	3	6	21
			Total Contact Hours : 26				

			VI SEMESTER				
S.No	Category	Course Code	Course Title	L	T	P	Credits
1	HSMC	80H04	Engineering Economics and Accountancy	3	-	-	3
2	PCC	80520	Design and Analysis of Algorithms	3	-	-	3
3	ESC	80613	Data Mining	3	-	-	3
			Professional Elective -IV				
4	PEC-IV	80605	Android Application Development	3	-	-	3
		80614	Internet of Things				
		80531	Advanced Computer Architecture				
5	OEC-I		**Open Elective-I**	3	-	-	3
6	HSMC	80H03	English Communication and Presentation Skills Lab	-	-	2	1
7	ESC	80615	Data Mining lab	-	1	2	2
8	ESC	80609	Android Application Development Lab	-	1	2	2
9	MC	80M03	Essence of Indian Traditional Knowledge	2	-	-	-
			Total	17	2	6	20
			Total Contact Hours : 25				

VII SEMESTER							
S.No	Category	Course Code	Course Title	L	T	P	Credits
1	PCC	80521	Big Data Analytics	3	-	-	3
2	ESC	80611	Machine Learning	3	-	-	3
3			**Professional Elective-V**				
	PEC-V	80532	Natural Language Processing	3	-	-	3
		80533	Deep Learning				
		80534	Mobile Computing				
4	OEC-II		**Open Elective-II**	3	-	-	3
5	PCC	80522	Big Data Analytics Lab	-	1	2	2
6	ESC	80612	Machine Learning Lab	-	1	2	2
7	PROJ	80P01	Internship - III/Mini project	-	-	4	2
8	PROJ	80P02	Project Stage I	-	-	4	2
			Total	12	2	12	**20**
			Total Contact Hours : 26				

VIII SEMESTER							
S.No	Category	Course Code	Course Title	L	T	P	Credits
1	ESC	80618	Information Security	3	-	-	3
2			**Professional Elective -VI**				
	PEC-VI	80620	Cyber Security	3	-	-	3
		80535	Cloud Computing				
		80536	Software Process & Project Management				
3	OEC-III		**Open Elective-III**	3	-	-	3
4	PROJ	80P03	Seminar	-	-	2	1
5	PROJ	80P04	Project Stage II	-	-	20	10
			Total	9	-	22	20
			Total Contact Hours : 31				

			LIST OF OPEN ELECTIVES		
S.No	**Branch**	**Course Code**	**Name of The Course**	**No. of Credits**
1.	CIVIL	80139	Environmental Impact Assessment and Life Cycle Analysis	3
2.		80148	Green Buildings	3
3.		80149	Disaster Management & Mitigation	3
4.	EEE	80234	Electrical Energy Conservation and Auditing	3
5.		80240	Electrical Safety and Energy Management	3
6.		80241	Energy Storage Systems	3
7.	MECH	80352	Total Quality Management	3
8.		80356	Industrial Safety	3
9.		80357	Renewable Energy Sources	3
10.	ECE	80435	Embedded System Design	3
11.		80446	Principles of Communication Engineering	3
12.		80447	Basics of VLSI Design	3
13.	CSE	80512	Database Management Systems	3
14.		80521	Big Data Analytics	3
15.		80535	Cloud computing	3
16.	IT	80605	Android Application Development	3
17.		80606	Python Programming	3
18.		80617	Artificial Intelligence	3
19.	MINING	82507	Drilling and Blasting	3
20.		82537	Material Handling	3
21.		82542	Tunneling Engineering	3
22.	ENGLISH	80H07	English Language Skills	3
23.		80H08	Interpretation Skills and Analytical Writing	3
24.		80H09	English for Academic and Research Writing	3
25.	MATHEMATICS	80B11	Computational Mathematics	3
26.		80B12	Applied Statistics	3
27.		80B13	Optimization Techniques	3
28.	PHYSICS	80B14	Advanced Physics for Engineers	3
29.		80B15	Nano Materials	3
30.		80B16	NDT and Vaccum Tehnology	3
31.	CHEMISTRY	80B17	Chemistry of Engineering Materials	3
32.		80B18	Nano Chemistry	3
33.		80B19	Polymer Chemistry	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: 80H01	ENGLISH (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 3		3	-	-

Pre-requisite: NIL
Course Objectives:
The objective of this course is to improve the English Language competency of the students, which emphasizes on all language components namely grammar, vocabulary, prose, short stories. Further, it also helps in developing the skills of Reading and Writing. As a result students are equipped to study the academic subjects more effectively using the theoretical and practical components of the English syllabus.

MODULE – I: **[10 Periods]**
Essay   : "Minimalism—Live a Meaningful Life" by Joshua Millburn and
                            Ryan Nicodemus
Poem   : **"**Road Not Taken" by Robert Frost
Vocabulary : Formation of Words, Prefixes, Suffixes, and Root Words
Grammar   : Articles and Prepositions
Reading   : Skimming and Scanning
Writing   : Introduction to Writing Skills, Characteristics of Effective Writing

MODULE - II: **[10 Periods]**
Essay   : "Knowledge Society" an excerpt from *Ignited Minds* by A.P.J Abdul
    Kalam
Poem   : "Life" by Sarojini Naidu
Vocabulary : Homonyms, Homophones, Homographs
Grammar   : Sentence Structures, Voice – Exercises
Reading   : Intensive Reading and Extensive Reading
Writing   : Paragraph Writing- use of cohesive devices; Arranging Jumbled
                            Sentences into Paragraph and Punctuation
MODULE - III: **[10 Periods]**
Short Story : " Half a Rupee Worth**"** by R.K Narayan .
Poem   : " If" by Rudyard Kipling
Grammar   : Tense, Aspect and Concord
Vocabulary : Idiomatic Expressions; Phrasal Verbs
Reading   : Reading for Theme and Gist.
Writing   : Essay Writing, Describing, Defining and Classifying

MODULE - IV: **[09 Periods]**
Biography   : "Jesse Owens"
Poem   : "I too Sing America" by Langston Hughes
Grammar   : Question Tags; Degrees of Comparison
Vocabulary : One Word Substitutions; Synonyms and Antonyms
Reading   : Reading for Interpretation
Writing   : Letter Writing- Both Formal and Informal

MODULE - V: **[09 Periods]**

Essay   : " Pecuniary Independence" by P.T Barnum
Poem   **:** " Human Family" by Maya Angelou
Grammar   **:** Direct and Indirect Speech, Misplaced Modifiers
Vocabulary   **:** Integrated Exercises in Vocabulary
Reading   **:** Reading for Specific Purposes, Reading Comprehension
Writing   **:** Summarizing, Redundancies and Clichés

* Exercises from the texts not prescribed shall also be used for classroom tasks.

TEXT BOOK:

1. T.V. Surendranatha Reddy, B.Vijay Kumar and K.James **"Effecive English "** First Edition Maruthi Publications,2017.

REFERENCES:

1. Azar, Betty and Stacy A, Hagen, Understanding and Using English Grammar, Foundation Books, 4th Edition, 2009.
2. Chaudhuri, Santanu Sinha, Learn English: A Fun Book of Functional Language**,** Grammar and Vocabulary, New Delhi: Tata McGraw Hill Education, , Paper Back Edition. 2013.
3. Eastwod, John: Oxford Guide to English Grammar, Oxford University Press, 4th Edition, 1994.
4. Field, Marion, Improve Your Written English, Kindle books, 5th Edition, 2009.
5. G. Leech and J. Svartvik , A Communicative Grammar of English, London: Longman, 3rd Edition, 2002.

E-RESOURCES:

1. http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes
2. http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.
3. http://www.zsme.tarnow.pl/jezykiobce/wp-content/uploads/2013/11/writing-letters1.pdf.

Course Outcomes:

At the end of the course, students will be able to:

1. Use English considerably well in written and spoken.
2. Enrich language accurately and fluently.
3. Employ extensive and intensive reading skills
4. Gain confidence in using English language and skills for writing in real life situations.
5. Use standard grammar, punctuation, and spelling in documents.

COs	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1								2	2	3		
CO2										3	2	
CO3		1	1									
CO4							1	2		2		2
CO5		1	2				1			2		

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code:80B01	ENGINEERING MATHEMATICS - I (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 4		3	1	-

Pre-requisite: Basics of Matrices and Calculus

Course Objectives:
To learn types of matrices and their properties, rank of the matrix to know the consistency and solving the system of linear equations. To find Eigen values and eigenvectors and to reduce the quadratic form to canonical form, To understand Concept of Sequence and series. Geometrical approach to the mean value theorems and their application to the mathematical problems

Module - I: Matrices [12 Periods]

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. LU - Decomposition Method.

Module - II: Eigen values and Eigen vectors [14 Periods]

Linear Transformation and Orthogonal Transformation: Eigen values and Eigen vectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

Module - III: Sequences & Series [13 Periods]

A: Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.
Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test;
B: Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Module - IV: Fourier Series [12 Periods]

Determination of Fourier coefficients- fourier series –even and odd function-Half range Fourier sine and cosine series expansions. Fourier series in an arbitrary interval – even and odd periodic continuation - Half range Fourier sine and cosine series expansions.

Module - V: Calculus [14 Periods]

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of

revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

E-RESOURCES:
1. http://www.yorku.ca/yaoguo/math1025/slides/chapter1/Kuttler-LinearAlgebra-Slides-SystemsofEquations-Handout.pdf (Systems of linear equations, matrices)
2. https://www.math.cmu.edu/~wn0g/2ch6a.pdf (Differential Calculus)
3. http://tutorial.math.lamar.edu/Classes/CalcII/ConvergenceOfSeries.aspx (Sequences & Series)
4. http://www.aidic.it/cet/16/51/055.pdf (Differential Calculus)
5. http://nptel.ac.in/courses/108106075/8 (Fourier Series)

Course Outcomes:
At the end of the course, students will be able to:

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Analyze the nature of sequence and series.
4. Determine Fourier series for different functions.
5. Solve the applications on the mean value theorems and evaluate the improper integral using beta and gamma functions.

	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											

COs	**Programme Outcomes(POs)**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3				2			3
CO2	3	2	2	3	2				2			3
CO3	3	2	2	3	2				2			2
CO4	3	2	2	3	3				2			2
CO5	3	2	2	3	3				2			2

Prerequisites: Fundamentals of Physics

Course Objectives:

The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of semiconductor physics along with the possible applications

MODULE-I   Principles of Quantum Mechanics   [12 Periods]

Qualitative discussion on black body radiation spectrum problem, Photo electric effect concept and Einstein's explanation; Postulates of Quantum mechanics, Louis de Broglie's concept of matter waves, Davisson and Germer's experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation, Physical Significance and properties of the Wave Function; Energy of a particle in One Dimensional infinite Potential well.

MODULE –II   Band Theory of Solids   [12 Periods]

Free electron theory of metals(Qualitatively), Fermi Level, Density of Energy States and Energy Band Diagrams, Bloch theorem for particle in a periodic potential (Qualitatively), Kronig-Penny Model(Qualitatively), E-K Diagram, Origin of Energy Bands in solids, Effective mass of an electron, Distinction between Metals, Semiconductors and Insulators.

MODULE –III   Semiconductor Physics   [12 Periods]

A: Intrinsic and Extrinsic Semiconductors, Expression for carrier concentration in intrinsic and extrinsic semiconductor, Qualitative treatment of Fermi energy level in Intrinsic and extrinsic semiconductors.

B: Direct and indirect band gap semiconductors, Carrier generation and Recombination, Drift and Diffusion, Equation of Continuity.

P-N Junction: Formation & V-I Characteristics, LED: Construction and Working Principle, Solar Cell: Construction & I-V Characteristics.

MODULE –IV   [14 Periods]

Lasers and Fiber Optics:

Lasers: Introduction to interaction of radiation with matter, Coherence, Einstein's coefficients, Principle and working of Laser, Population inversion, Pumping, Semiconductor LASER, Applications of laser.

Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total Internal Reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibers, Losses associated with optical fibers, Applications optical fibers.

MODULE –V   Electromagnetic Theory   [14 Periods]

Gradient of Scalar field and its Physical Significance; Divergence and Curl of Vector field; Qualitative treatment of Gauss's Law of electrostatics and Gauss law of magneto statics, Ampere's law and its modification, Faraday's law of electromagnetic induction, Induced E.M.F in a conductor, Lenz's Law, Maxwell equations in differential form, wave equation for free space.

TEXT BOOKS:
1. K Vijaya Kumar, S Chandralingam, "**Modern Engineering Physics**'' Volume I & II, S. Chand, 1st Edition, 2017.
2. J.Singh,"Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill.ink, 1995.

REFERENCES:
1. P K Palanisamy, "**Engineering Physics**", SciTech Publication, 4th Edition, 2014.
2. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India
   Revised Edition, 2014.
3. R K Gaur and SL Gupta, "**Engineering Physics**" Dhanpat Rai Publications, Eighth Revised Edition, 2006.
4. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
5. P. Bhattacharya, "**Semiconductor Optoelectronic Devices**", Prenticehall of India,1997

E-RESOURCES
1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.researchgate.net/publication/292607115_Applied_Physics
3. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
4. http://www.springer.com/physics/journal/340
5. http://nptel.ac.in/courses/113104012/
6. https://www.youtube.com/watch?v=jnjjWI1s9_s&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0
7. https://www.youtube.com/watch?v=4a0FbQdH3dY

Course Outcomes:
At the end of the course, students will be able to:

1. Acquire the theoretical information about matter in terms of quantum physics
2. Analyze the formation the bands thereby classification of materials on the basis of transport properties.
3. Understand the fundamentals of semiconductor physics and also the Optoelectronics
4. Be aware of the concepts and applications of LASER and Optical fibers.
5. Apply basic knowledge on electromagnetic principles and using these wave equations for the propagation

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1									
CO2	3	1	2									
CO3	3	2	2									
CO4	3	2	2									
CO5	2	2	1									

Prerequisites: NIL

Course Objectives:

This course provides the fundamental concepts of computers and introduce to the students to the field of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

MODULE I: Fundamentals and Introduction to 'C' Language   [11 Periods]

Fundamentals: Hardware, Software, Programming languages, Number Systems, Translators, Introduction to Operating System, Program Development steps - Algorithm, Flow charts.

Introduction to 'C' Language: History, Simple C Program, Identifiers, Preprocessor Directives- Include and define, Basic data types, User-defined data types, Variables, Constants, Type qualifiers, Managing Input / Output, Operators, Precedence and Associativity, Expression Evaluation, Type conversions, Simple 'C' Programming examples.

MODULE II: Control Statements & Arrays   [09 Periods]

Control Statements: Conditional statements- if and switch statements, ternary operator?: , Loop Control Statements – while, for, do-while, break, continue and goto statements. Arrays: Basic concepts, One-dimensional arrays, Two–dimensional arrays, Multi-dimensional arrays.

MODULE III: Strings & Pointers   [09 Periods]

A: Basic concepts, String Input / Output functions, Arrays of strings, String handling functions.

B: Basic concepts, Pointer arithmetic, Pointers and strings, Pointers and arrays, Dynamic Memory Allocation**.**
.

MODULE IV: Functions & Derived Types   [09 Periods]

Functions - Basics, User defined functions, Inter function communication, Library functions, Storage Classes-auto, register, static, extern, Scope rules, Array and string manipulations using functions, Recursive functions, Pointers and functions.

Derived types - Structures – Basic concepts, Nested structures, Arrays of structures, Structure manipulations using functions, Pointers to structures, Self-referential structures, Unions, bit fields

MODULE V: File I/O, Sorting and Searching   [10 Periods]

File I/O: Basic concepts, Text files and Binary files, File input / output operations, File status functions (error handling), Command-Line Arguments, C programming examples.

Sorting and Searching: Sorting - selection sort, bubble sort, insertion sort, searching - linear and binary searching methods**.**

TEXT BOOKS
1. PradipDey, Manas Ghosh, **"Programmingin C"**, Oxford University Press, 2nd Edition, 2011.
2. E. Balagurusamy, "**Computer Programming in C"**, Tata McGraw Hill, 1st Edition, 2013.

REFERENCES
1. Brian W. Kernighan, Dennis M. Ritchie, "**The C Programming Language"**, PHI, 2nd Edition, 1990.
2. Greg Perry and Dean Miller, "**C Programming Absolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F. Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011.

 E–RESOURCES
1. http://oxford university press.ac.in/eBooks/ Programming in C.
2. https://www.journals.elsevier.com/science-of-computer-programming
3. http://www.ejournalofsciences.org
4. http://onlinecourses.nptel.ac.in/iiitk_cs-101
5. http://onlinevideolecture.com/ebooks/?subject=C-Programming

Course Outcomes:
At the end of the course, students will be able to
1. Understand the basic terminology, write, compile and debug programs in computer programming.
2. Apply different types of control structures and arrays in a computer programming.
3. Develop programs that make use of concepts such as strings and pointers in C language.
4. Compare parameter passing techniques, structures and unions in computer programming.
5. Analyze file operations, searching and sorting methods.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	2	2									3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	
CO4			3		3									3	
CO5		2	2		3								3	2	

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Prerequisites: NIL
Course Objectives:
To sensitize the students to the intelligibility in their pronunciation of English, speech sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, *viz* listening and speaking skills. Hence it helps to train the students to understand nuances of both verbal and non verbal communication during all activities. The purpose of this course is to develop confidence levels of the students and to face the audience and participate in public speaking.

Listening Skills:
Objectives:
1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.
• Listening for general content
• Listening to fill up information
• Intensive listening
• Listening for specific information

Speaking Skills:
Objectives:
1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
• Oral practice
• Describing objects/situations/people
• Just A Minute (JAM) Sessions.
English Language Communication Skills Lab shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab
The following course content is prescribed for the English Language Communication Skills Lab

MODULE - I:
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session
Listening: listening for sounds in context, for ideas.
Speaking: ideation and translation of ideas into sentences.

MODULE - II:
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Listening: listening for specific purposes, for details.
Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

MODULE - III:
A: CALL Lab: Word accent and Listening Comprehension-reading(aloud) meaningfully.
B: ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Listening: listening for intelligible English
Speaking: formal and informal conversations, register.

MODULE - IV:
CALL Lab: Intonation and Common errors in Pronunciation- reading aloud(evaluating through recording).
ICS Lab: Extempore- Public Speaking, Oral Presentation Skills
Listening: note taking and listening for speaker's tone/attitude
Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

MODULE - V:
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Information Transfer, Debate

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

REFERENCES:
1. Gairns, Ruth and Redman , Stuart: Oxford Word Skills, Learn and Practice English Vocabulary, 2nd Edition, 2008.
2. Hughes , John and Mallett , Andrew: Successful Presentations: DVD and Student's Book Pack: A Video Series Teaching Business Communication Skills for Adult Professionals
3. Hamcock, English pronunciation in use (Intermediate),Cambridge university Press,2009
4. Karia , Akash: Public Speaking Mastery, Speak Like a Winner , Kindle Edition, 2013.
5. Lucas, Stephen: The Art of Public Speaking" : Tata McGraw Hill, 11th Edition, 2011.

E-RESOURCES:
1. http://www.mindtools.com/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b7
   1360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf

Course Outcomes:
At the end of the course, students will be able to:
1. Understand the nuances of language through audio- visual experience and group activities
2. Neutralize the accent for intelligibility
3. Realize the importance of listening skills and speaking skills and their application in real life situations.
4. Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
5. Speak with clarity and confidence thereby enhance employability skills of the students.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		1				1		1	2	2		1
CO2										1		1
CO3							1		1	2		2
CO4								1	1	2		2
CO5										2		2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80B04	APPLIED PHYSICS LAB (Common to EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL
Course objectives:
The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments:

1 Planck's constant:
   To determine Planck's constant using Photo electric effect.
2 Energy band –gap of a semiconductor:
   To determine the energy band gap of a semiconductor
3 V-I and P-I characteristics of light emitting diode
   Plot V-I and P-I characteristics of light emitting diode
4 Laser diode:
   To study the Characteristics of Laser diode
5 Solar Cell:
   To study the V-I Characteristics of solar cell
6 LCR Circuit:
   To determination of resonant frequency, bandwidth and quality factor of RLC circuit.
7 Numerical Aperture of an Optical fiber:
   To determine the Numerical aperture of the given fiber
8 Bending Loss of a Fiber:
   To determine the bending loss of the given fiber.
9 Light Dependent Resistance (LDR):
   To determine the characteristics of a LDR
10 Stewart and Gee's experiment
   Determination of Magnetic field along the axis of current carrying circular coil
11 Torsional pendulum
   To determine the rigidity modulus of a given wire
12 Sonometer
   To verify the frequency of AC power supply

Course Outcomes:
 At the end of the course, students will be able to:
   1. Develop skills to impart practical knowledge in real time solution.
   2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
   3. Design new instruments with practical knowledge.
   4. Understand measurement technology
   5. Use of new instruments and real time applications in engineering studies.

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1									
CO2	3	1	1									
CO3	3											
CO4	3											
CO5	3											

CO – PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80502	**PROGRAMMING FOR PROBLEM SOLVING LAB**	**L**	**T**	**P**
Credits: 1	(Common for EEE, ECE, CSE and IT)	-	-	2

Prerequisites: NIL

Course Objectives:

This course provides the fundamental concepts of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

Software Requirements: C

List of Programs:

1. a. Practice various Internal and External DOS Commands.
    b. Implement various programs logics using algorithms and flowcharts.
    c. Write sample examples of C programs to implement basic operations.
2. a. Write a C program to find smallest and largest of given three numbers.
    b. Write a C program to find the roots of a quadratic equation.
3. a. Write a C program to find the sum of individual digits of a positive integer.
    b. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
    c. Write a C program to generate the first n terms of the sequence.
4. a. Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
    b. Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.
5. Write C programs that use both recursive and non-recursive functions
    a. To find the factorial of a given integer.
    b. To find the GCD (greatest common divisor) of two given integers.
6. a. Write a C program to find both the largest and smallest number in a list of integers.
    b. Write a C program that uses functions to perform the following:
        i.   Addition of Two Matrices
        ii. Multiplication of Two Matrices
7. a. Write a C program that uses functions to perform the following operations:
        i.   To insert a sub-string into given main string from a given position.
        ii. To delete n characters from a given position in a given string.
    b. Write a C program to determine if the given string is a palindrome or not
    c. Write a C program to find substring in a given string.
    d. Write a C program to count the lines, words and characters in a given text.
8. a. Write a C program to implement functions arguments with different returns values.
    b. Write a C program to implement call by value and call by reference using functions.
9. a. Write a C program to find grades of a student's using structures and unions.

    b.   Write a C program to implement nested structures.
10   a.   Write a C program which copies one file to another.
    b.   Write a C program to command line arguments.
11   a.   Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search.
    b.   Write a C program that uses recursive and non -function to search for a Key value in a given sorted list of integers using Binary search.
12   a.   Write a C program that implements the Selection sort method to sort a given array of integers in ascending order.
    b.   Write a C program that implements the Bubble sort method to sort a given list of names in ascending order.

TEXT BOOKS:
1. PradipDey, ManasGhosh, **"Programming in C"**, Oxford University Press, 2nd Edition, 2011.
2. E.Balagurusamy, "**Computer Programming in C"**, Tata McGraw Hill, 1st Edition, 2013.

REFERENCES:
1. Brian W. Kernighan, Dennis M. Ritchie, "**The C Programming Language"**, PHI, 2nd Edition, 1990.
2. Greg Perry and Dean Miller, "**C Programming Absolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F.Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011.

Course Outcomes:
At the end of the course, students will be able to
1. Analyze concepts in problem solving do programming in C language and write diversified solutions using C language.
2. Identify situations where computational methods and computers would be useful.
3. Understand the programming tasks using techniques learned and write pseudo-code.
4. Compare the program on a computer, edit, compile, debug, correct, recompile and run it.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task

COs	**CO- PO, PSO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

| COs | Programme Outcomes(POs) | PSOs |

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3	2									3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	
CO4			3		3								2	3	
CO5		2	2		3								3	2	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80303	ENGINEERING WORKSHOP (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Pre requisite: NIL
Course Objectives:
To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.

1. **Trades for Exercises:**
   At least two exercises from each trade:
   1. Carpentry
   2. Fitting
   3. Tin-Smithy
   4. House-wiring
   5. Foundry
   6. Arc welding

2. **Trades for Demonstration & Exposure**

   1. Machine shop
   2. Plumbing
   3. Wood working lathe
   4. Identification of Electronic Components
   5. Black smithy
   6. Computer Peripherals

Course Outcomes
At the end of the course, students will be able to
   1. Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments.
   2. Assembling together of part and removing metals to secure the necessary joint by using fitting and welding.
   3. Understand the hardware components of house wiring.
   4. Understand the manufacturing process using machine shop.
   5. Analyze the different types of computer Peripherals

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes(POs)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2	2	1		3			3
CO2	3				2	2	1		3			3
CO3	3				2	2	1		3			3
CO4	3				2	2	1		3			3
CO5	3				2	2	1		3			3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80B06	ENGINEERING MATHEMATICS -II (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Basic Calculus
Course Objectives:
To learn
• Methods of solving the differential equations of first and higher order.
• Evaluation of multiple integrals and their applications
• The physical quantities involved in engineering field related to vector valued functions
• The basic properties of vector valued functions and their applications to line, surface and volume integrals
Partial differentiation, concept of total derivative
• Finding maxima and minima of function of two and three variables

MODULE - I: First Order ODE   [13 Periods]
Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

MODULE - II: Ordinary Differential Equations of Higher Order [13 Periods]
Rules for finding Complementary function-Particular integral (Non-homogeneous term of the type $e^{ax}, \sin bx / \cos bx, x^n, e^{ax}V(x), x^nV(x)$ only), Method of variation of parameters. Equations reducible to constant coefficients - Cauchy - Euler and Legendre's equations.

MODULE - III: Multivariable Calculus   [12 Periods]
A: Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence.
B: Maxima and minima of functions of two variables and three variables using Lagrange's method of undetermined multipliers.

MODULE - IV: Multiple Integrals   [13 Periods]
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

MODULE - V: Vector Calculus   [13 Periods]
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Scalar potential functions. Solenoidal and Irrotational vectors. Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edit ion, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002

REFERENCES:
1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

E-RESOURCES
1. https://www.math.ust.hk/~machas/differential-equations.pdf(Differential equations)
2. http://www.staff.ttu.ee/~lpallas/multipleintegrals.pdf (Multiple Integrals)
3. http://www.mecmath.net/calc3book.pdf (Vector Calculus)
4. http://www.sciencedirect.com/science/article/pii/0022247X7690216X(Multiple Integrals)
5. http://nptel.ac.in/courses/122104017/28 (Multiple Integrals)

Course Outcomes:
At the end of the course, students will be able to
1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems
3. Determine extreme values of functions.
4. Evaluate the multiple integrals and apply the concept to find areas, volumes.
5. Evaluate the line, surface and volume integrals and converting them from one to another

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	2	2			2	2		3
CO2	3	3	3	3	2	2			2			3
CO3	3	3	3	3	2	2			2	2		3
CO4	3	3	3	3	3				2			3
CO5	3	3	3	3	2	3			2	2		3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech II Semester		
Code: 80B03	ENGINEERING CHEMISTRY (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 4		3	1	-

Pre requisites: NIL
Course objectives:
The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge on atomic-molecular orbital's, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use. They will also impart the knowledge of stereochemistry, understanding the chemical reaction pathway mechanisms and synthesis of drugs.

MODULE I: Water and its treatment   **[12 Periods]**

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale & Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization. Desalination by Reverse osmosis and its significance.

MODULE II: Molecular structure and Theories of Bonding: **[12 Periods]**

Introduction to Molecular orbital Theory. Linear Combination of Atomic Orbital's (LCAO), significance of bonding and anti-bonding molecular orbital, Conditions for the formation of molecular orbital's. Molecular orbital energy level diagrams of diatomic molecules -, N_2 ,O_2 and F_2. Introduction to coordination compounds-ligand-coordination number (CN) - spectro chemical series. Salient features of crystal field theory, Crystal field splitting of transition metal complexes in octahedral ($[CoF_6]^{3-}$ and $[Co(CN)_6]^{3-}$) and tetrahedral ($[NiCl_4]^{2-}$ and $[Ni (CN)_4]^{2-}$) fields - magnetic properties of complexes. Band structure of solids and effect of doping on conductance.

MODULE III: Electrochemistry and Corrosion   **[16 Periods]**

A. Electrochemistry:
Introduction to Electrochemistry-Conductance (Specific and Equivalent) and units. Types of cells-electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential- cell potential (EMF).Electrochemical series and its applications, Nernst equation its applications and numerical problems. Reference electrodes - Calomel Electrode, Quinhydrone electrode and Glass electrode-determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary (Lead-Acid cell, Ni-Cd

cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

B. Corrosion:

Causes and effects of corrosion: Theories of corrosion - Chemical & Electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion: Galvanic and Water-line corrosion. Factors affecting rate of corrosion-Nature of metal and Nature of Environment, Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic methods). Surface coatings: Methods of metallic coatings - hot dipping (Galvanization), Electroplating (Copper) and Electroless plating (Nickel).

MODULE IV: Stereochemistry & NMR Spectroscopy: [12 Periods]

Introduction to Isomers - classification of isomers - structural (chain, positional & functional) and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism of n-Butane. Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift, spin-spin splitting, coupling constant in 2-butene.

MODULE V: Reaction mechanism and synthesis of drug molecules   [12 Periods]

Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN^1 & SN^2) - addition (Ad_E) -elimination (E_1&E_2) reactions with suitable example. Ring opening (Beckmann rearrangement-preparation of Nylon-6), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions. Synthesis of Paracetamol, Ibuprofen and their applications.

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "A Text Book of Engineering Chemistry", DhanpatRai Publications, New Delhi, 16th Edition 2014.
2. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", S Chand Publications, New Delhi, 12th Edition 2010.
3. B.R.Puri, L.R.Sharma and M.S.Pathania,"Principles of Physical Chemistry", S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.

REFERENCES:

1. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, "Text Book of Engineering chemistry", Cengage Learning India Pvt.Ltd,2016.
2. M.G. Fontana and N. D. Greene, "Corrosion Engineering", McGraw Hill Publications, New York, 3rd Edition, 1996.
3. K. P. C. Volhardt and N. E. Schore, "Organic Chemistry: Structure and Function", 5th Edition, 2006.

E-RESOURCES:

1. https://books.google.co.in/books?isbn=0070669325 (Engineering chemistry by Sivasankar).
2. https://archive.org/stream/VollhardtOrganicChemistryStructureFunction6th/Vollhardt_Organic_Chemistry_Structure_Function_6th_djvu.txt.
3. http://americanhistory.si.edu/fuelcells/sources.htm (Fuel Cell Information Sources)
4. https://www.abctlc.com/downloads/courses/WaterChemistry.pdf (Water Chemistry)
5. nptel.ac.in/courses/113108051/ (corrosion & electrochemistry web course)

Course Outcomes:

At the end of the course, students will be able to:

1. Understand water treatment, specifically hardness of water and purification of water by various methods.
2. Acquire knowledge on electrochemical cells, fuel cells, batteries and their applications.
3. Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity.
4. Acquire basic knowledge on the concepts of stereochemistry.
5. Acquire basic knowledge on chemical reaction mechanisms and that are used in the synthesis of molecules.

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak
	Programme Outcomes(POs)
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	1	2						
CO2	3	2	1	1								
CO3	3	3	1	3	1	2	1	1	1			
CO4	1		1		1	1		1				
CO5	3	3	3	2	2	1	1		1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80201	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**L**	**T**	**P**
Credits: 3	**(Common for EEE, ECE, CSE and IT)**	**3**	**-**	**-**

Prerequisites: NIL

Course Objectives: To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

MODULE I : DC Circuits [09 Periods]

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws - Series, parallel, series-parallel, star-to-delta and delta-to-star transformation- analysis of simple circuits with dc excitation. Superposition, Thevenin's and Maximum Power Transfer Theorems with DC excitation.

MODULE II: AC Circuits 09 Periods]

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

MODULE III: Introduction to Electrical Machines [10 Periods]

A: DC Machines : Construction & Principle of Operation of DC Generators – E.M.F Equation. Principle of operation DC Motors – Back E.M.F. - Torque equation – Brake Test -Characteristics.

B: AC Machines: Construction and Principle of operation of Transformer- EMF Equation. Construction and Principle of Operation of 3 Phase Induction Motors - Brake test on 3-Phase Induction Motor – Applications.

MODULE IV: P-N Junction Diode [10 Periods]

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

Rectifiers : P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier.

Filters : Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

MODULE V : BJT and Junction Field Effect Transistor (JFET) [10 Periods]

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations

Junction Field Effect Transistor and MOSFET: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.

TEXT BOOKS

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, "Basic Electrical and Electronics Engineering", S.Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R.L.Boylestad and Louis Nashlesky, "Electronic Devices & Circuit Theory", Pearson Education, 2007.

REFERENCES

1. V.K. Mehtha and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand & Co., 2009.
2. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), "Electronic Devices and Circuits", 3 rd edition, Tata McGraw Hill, New Delhi.
3. Thomas L. Floyd and R. P. Jain, "Digital Fundamentals", Pearson Education, 2009.
4. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 2008.
5. Nagrath I.J. and D. P. Kothari, "Basic Electrical Engineering", Tata McGraw Hill, 2001.
6. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Education, New Delhi, 2nd Edition, 2005.

E - RESOURCES

1. https://www.electrical4u.com/ohms-law-equation-formula-and-limitation-of ohms-law/
2. https://www.eeweb.com/passives
3. http://nptel.ac.in/courses/108108076/
4. http://nptel.ac.in/downloads/108105053/

Course Outcomes:

At the end of the course, students will be able to:

1. Apply basic laws in electrical circuit.
2. Analyze the single phase circuits
3. Comprehend the construction and Operation of DC and AC machines
4. Know the practical importance of Diode and its characteristics
5. Recognize the construction and operation of BJT and JFET

<table>
<tr><td colspan="13">CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes(POs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO5</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
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2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80503	**DATA STRUCTURES**	**L**	**T**	**P**
Credits: 3	(Common for EEE, ECE, CSE and IT)	3	-	-

Prerequisites: Computer Programming
Course Objectives:
This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

MODULE-I: Performance Analysis and Introduction to data structures

[10 Periods]
Performance Analysis: Algorithm definition and characteristics, time and space complexity, Asymptotic Notations – Big O, Omega and Theta notations.
Introduction to data structures: Types of data structures: Linear and Non-linear data structures. Recursion definition- Linear and Binary recursion, Design methodology and implementation of recursive algorithms, Recursive algorithms for Towers of Hanoi.

MODULE-II: Linked Lists **[09 Periods]**
Single Linked Lists: Definition, Operations-Insertion, Deletion and Searching, Concatenating single linked lists, Circular linked lists, Operations- Insertion, Deletion.
Double Linked Lists: Definition, Operations- Insertion, Deletion. Applications of Linked list. Sparse matrices - Array and linked representations.

MODULE-III: Stacks and Queues **[10 Periods]**
A: Stacks: Basic stack operations, Representation of a stack using arrays and linked lists, Stack Applications - Reversing list, factorial calculation, postfix expression evaluation, infix-to-postfix conversion.
B:Queues: Basic queue operations, Representation of a queue using array and Linked list, Classification and implementation – Circular, Enqueue and Dequeue, Applications of Queues.

MODULE-IV: Trees and Graphs **[10 Periods]**
Trees: Basic concepts of Trees, Binary Tree: Properties, Representation of binary tree using array and linked lists, operations on a binary tree, binary tree traversals, creation of binary tree from in, pre and post-order traversals, Tree traversals using stack, Threaded binary tree.
Graphs: Basic concepts of Graphs, Representation of Graphs using Linked list and Adjacency matrix, Graph algorithms, Graph traversals- (BFS & DFS).

MODULE-V: Search Trees **[09 Periods]**
Binary Search Trees and AVL Trees: Binary Search Tree, Definition, Operations - Searching, Insertion and Deletion, AVL Trees (Elementary treatment-only Definitions and Examples).B-Trees and Red-Black Tree: B-Trees, Red-Black and Splay Trees (Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

TEXT BOOKS:

1. Jean Paul Tremblay, Paul G Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hills, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudo code approach with C ", Thomson (India), 2nd Edition, 2004.

REFERENCES:
1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, "Fundamentals of Data Structure in C", University Press (India), 2nd Edition, 2008.
2. A. K. Sharma, "Data structures using C", Pearson, 2nd Edition, June, 2013.
3. R. Thareja, "Data Structures using C", Oxford University Press, 2nd Edition, 2014.

E-RESOURCES:
1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

Course Outcomes:
At the end of the course, students will be able to
1. Identify the appropriate data structures and analyze the performance of algorithms.
2. Understand and implement single, double, and circular linked-lists.
3. Implement Stacks and Queues using array and linked-list representations.
4. Develop programs by using non linear data structures such as trees and graphs.
5. Design and Implement applications of advanced data structures.

<table>
<tr><td colspan="15" align="center">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12" align="center">Programme Outcomes(POs)</td><td colspan="3" align="center">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr>
<tr><td>CO2</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td></td></tr>
<tr><td>CO3</td><td></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>1</td></tr>
<tr><td>CO4</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr>
<tr><td>CO5</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr>
</table>

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80301	**ENGINEERING GRAPHICS** (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 2		1	-	2

Prerequisites: Nil
Course Objectives:
The students will be able to understand the manual drawings and getting fundamental knowledge on drafting software.

MODULE I: Introduction, Curves and Projections [10 Periods]
Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance. Lettering and dimensioning. Geometrical Constructions: Regular polygons only.
Curves: Conic Sections eccentricity method. Cycloid and Involutes.
Projections: Principles of Orthographic Projections – Conventions – First and Third Angle projections. Projection of points including all four quadrants.

MODULE II: Projection of Lines & Planes [10 Periods]
Projection of Lines: Projection of Lines - Parallel, perpendicular, inclined to one reference plane and inclined to both reference planes. True length and true angle of a line
Projection of Planes: Projection of Planes - inclined to both the planes.

MODULE III: Projection of Solids & Computer Graphics [10 Periods]
A. Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotating object method. Axis inclined to one reference plane.
B. Over view of Computer Graphics: Demonstrating knowledge of the theory of CAD software. Menu systems, toolbars [Draw, Modify and Dimension], drawing area annotations. Creation of 2D sketches and 3D models.

MODULE IV: Section of Solids & Development of Surfaces [09 Periods]
Section of Solids: Sectioning of single solids with the cutting plane inclined to one plane and perpendicular to the other - true shape of section.
Development of Surfaces: Development of lateral surfaces of simple and sectioned simple Solids.

MODULE V:Isometric Projections & Transformation of Projections [09 Periods]
Isometric Projections: Principles of Isometric Projection – Isometric Views– Conventions –Plane Figures, Simple Solids.
Transformation of Projections: Conversion of Isometric Views to Orthographic Views and vice versa– simple objects.

TEXT BOOKS:
1. K.L.Narayana, S.Bheemanjaneyulu "Engineering Drawing with Auto CAD-2016" New Age International Publishers 1st Edition, 2018.

2. N.D. Bhat, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.

REFERENCES:
1. K.L.Narayana, P. Kannaiah, "Engineering Drawing", SciTech Publishers. 2nd Edition, 2017
2. K. Venugopal, "Engineering Drawing", New Age International Publishers, 3rd Edition, 2014.
3. K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.
4. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2011.
5. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. international Publishing House, 3rd Edition, 2011.

E - RESOURCES:
1. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering +drawing
2. https://www.wiziq.com/tutorials/engineering-drawing
3. http://freevideolectures.com/Course/3420/Engineering-Drawing
4. http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711
5. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics
6. http://nptel.ac.in/courses/112103019/

Course Outcomes

At the end of the course, students will be able to
1. Understand the basics of drawings and importance of curves.
2. Draw the projection of points, lines and planes.
3. Draw the projection of solids and section of solids with software.
4. Produce development of surface and isometric projections with software.
5. Convert orthographic views to isometric views and vice-versa by drafting software.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1							3		3
CO2	3		1							3		3
CO3	3		1							3		3
CO4	3		1							3		3
CO5	3		1							3		3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80B05	**ENGINEERING CHEMISTRY LAB** (Common for EEE,ECE,CSE and IT)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Prerequisites: NIL

Course objectives:

To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Total Hardness of water by EDTA Method.
3. Estimation of pH of an acid (Three methods).
4. Estimation of alkalinity of water.
5. Estimation of strength of an acid by Conductometry.
6. Estimation of strength of an acid by Potentiometry.
7. Estimation of Mn^{+2} ion in $KMnO_4$ by Colorimetry.
8. Determination of viscosity of given liquids by Ostwald's viscometer.
9. Determination of surface tension of given sample using stalagmometer.
10. Estimation of iron (II) by dichrometry.
11. Determination of rate constant of hydrolysis of methyl acetate.
12. Preparation of Aspirin.

Course outcomes:

At the end of the course, students will be able to
1. Estimate the hardness of given water samples.
2. Select lubricants for various purposes.
3. Prepare advanced polymers & drug materials.
4. Know the strength of an acid present in batteries.
5. Calculate the amount of Mn^{+2} present in unknown substances/ores using instrumental methods.

	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	1								
CO2	2	1	2									
CO3	2	2		1								
CO4	2	2	1									
CO5	2	1	2									

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80202	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**	L	T	P
Credits: 1	(Common for EEE ,ECE, CSE and IT)	-	-	2

Prerequisites: NIL

Course Objectives: To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyse the performance of DC Motors, AC Motors and Transformers.

List of Experiments:

1. Verification of Kirchhoff's Laws.

2. Verification of Maximum Power Transfer Theorem.

3. Determination of Phase Angle for RC series circuit.

4. Brake Test on DC-Shunt Motor. Determination of Performance curves

5. Load Tests on Single Phase Transformer

6. Brake Test on Three Phase Induction Motors. Determination of Performance curves

7. V-I Characteristics of PN junction Diode

8. V-I Characteristics of Zener Diode

9. Half Wave Rectifier and Full Wave rectifier.

10. Input and Output characteristics of BJT with CE configuration

11. Input and Output characteristics of BJT with CB configuration

12. Input and Output Characteristics of JFET.

Course Outcomes:
At the end of the course, students will be able to
1. Analyze electrical circuits by applying basic laws
2. Analyze the performance of DC Motor, three phase Induction motor and transformer
3. Understand V-I Characteristics of various diodes
4. Design Different Rectifier Circuits
5. Differentiate the Transistors and their Operations

	CO- PO Mapping										
	(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak										
COs	**Programme Outcomes(POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3					3			3
CO2	3	3	3	3					3			3
CO3	3	3	3	3					3			3
CO4	3	3	3	3					3			3
CO5	3	3	3	3					3			3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: 80504	DATA STRUCTURES LAB (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL
Course Objectives:
This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

Software Requirements: C

List of Programs:
1 Write a recursive program to solve Towers of Hanoi problem - N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.
2 Write a program to create a single linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count no of elements.
3 Write a program to create a circular linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.
4 Write a program to create a double linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.
5 Write a program to implements stack operations using:
   a) Arrays
   b) Linked list
6 Write a program to:
   a) Evaluate Postfix expression.
   b) Convert infix expression into postfix expression
7 Write a program to implements Linear Queue operations using:
   a) Arrays
   b) Linked list
8 Write a program to implements Circular Queue operations using Arrays
9 Write a program to implements Double-ended Queue operations using:
   a) Arrays
   b) Double Linked List
10 Write a recursive program to create a Binary Tree of integers, traverse the tree in preorder, in order and post order and also print the number of leaf nodes and height of the tree.
11 Write a program to create a Binary Search Tree (BST) and perform insert and

search operations on it.

12. Write a program for implementing the following graph traversal algorithms:
    a) Breadth First Search (BFS)
    b) Depth First Search (DFS)

TEXT BOOKS
1. Jean Paul Tremblay, Paul G Sorenson, "**An Introduction to Data Structures with Applications**", Tata McGraw Hills, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, "**Data Structures: A Pseudo code approach with C** ", Thomson (India), 2nd Edition, 2004.

REFERENCES
1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, "**Fundamentals of Data Structure in C**", University Press (India), 2nd Edition, 2008..
2. A. K. Sharma, "**Data Structures using C**", Pearson, 2nd Edition, June, 2013.
3. R. Thareja, "**Data Structures using C**", Oxford University Press, 2nd Edition, 2014.

Course Outcomes:
At the end of the course, students will be able to
1. Identify the appropriate recursive algorithms and analyze the performance of algorithms.
2. Understand and implement single, double, and circular linked-lists.
3. Implement linear data structures such as Stacks and Queues using array and linked-list representations.
4. Implement non linear data structures such as trees and graphs.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3											3	1
CO4		2	3										2	3	

Prerequisites: NIL

Course Objectives:

To develop student's skill in Computer graphics for communicating the concepts and ideas in engineering products by using drafting software.

List of Exercises

Any 12 exercises out of fourteen should be done by using drafting software

1. Drawing of basic drawing elements and Regular polygons.
2. Drafting projections of lines- parallel, perpendicular, inclined to one reference plane.
3. Drafting projections of lines - inclined to both reference planes.
4. Drafting projections of lines inclined to both reference planes - obtaining true length.
5. Drafting Projections of planes – Surface inclined to one reference plane.
6. Drafting of regular solids - cube, prism, pyramid, cylinder and cone.
7. Drafting projection of solids inclined to one plane.
8. Drafting projection of section of solids cutting plane inclined to one plane.
9. Drafting development of surface of regular solids - prism
10. Drafting development of surface of regular solids - cylinder, cone
11. Drafting Isometric Projection – Isometric Views- Plane Figures
12. Drafting Isometric Projection – Isometric Views- Simple Solids.
13. Conversion of Isometric Views to Orthographic Views.
14. Conversion of Orthographic Views to Isometric Views.

Course Out comes:

At the end of the course, students will be able to

1. Draft basic drawings elements.
2. Draw the projection of points, lines and planes on Cartesian coordinates using drafting software.
3. Draw the projection solids on Cartesian coordinates using drafting software.
4. Develop surfaces of regular solids, sectional solids and solids inclined to one axis using drafting software.
5. Convert and develop the isometric views on to orthographic projections using drafting software.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		1		3				2	3		2
CO2	3		1		3				2	3		2
CO3	3		1		3				2	3		2
CO4	3		1		3				2	3		2
CO5	3		1		3				2	3		2

Prerequisites: NIL
Course objectives:
To develop physical skills and fitness specific to a particular sport. Provide them the training and coaching towards achieving their group goals. To give the students health and physical fitness to ensure mental and emotional balance. NSS (**National Service Scheme)** provides ample opportunities for the students to participate in the community service programs. To encourage them to become socially and environmentally sensitive, empathetic and responsible individuals of the nation.

MODULE-I [6 Periods]
Introduction and Basic concepts of NSS: History, Philosophy, aims & Objectives of NSS, Emblem, Motto, Song and Other Components of NSS, **NSS Programmes and Activities- Concept of regular activities,** Special camping, Day camps. Basis of adoption of villages/ slums & methodology of survey.

MODULE-II [6 Periods]
Volunteerism and Shramdan- needs &Importance of Volunteerism, Motivation and Constraints of Volunteerism, Shramdan as a part of Volunteerism.

MODULE-III [6 Periods]
Introduction of physical education: Importance of physical education, Athletics (Track events and combined events), Basket ball, Throw ball, Foot ball.

MODULE-IV [6 Periods]
Youth and Yoga- yoga as a tool for healthy lifestyle, Yoga as a preventive, promotive& curative method. Pranayam and Different Yoga traditions and their impacts.
Various competitions at different levels- Athletics (field events), volleyball, handball, cricket. Indoor games: Table Tennis, Caroms, chess

MODULE-V [6 Periods]
Environmental Issues- Natural Resource Management (Rain water Harvesting, energy conservation etc.). Waste Management, Disaster Management- Role of youth in Disaster Management.
Civil / Self Defense- Aims and objectives of Civil defense and need for self-defense training.

TEXT BOOKS:
1. Christopher G. Petre, **"Social Work with Children and Their Families: Pragmatic Foundations "**, Journal Vol:24, No.3, September 18th, 2003, 2nd Edition.

REFERENCES:
1. Pamela Grundy & Susan Shackleford, "**Shattering the Glass: The Remarkable History of Women in Basketball**" Published 15th May, 2007.
2. Roger Kahn, "The **Boys of Summer**", 1st Edition, May 9th 1973.
3. Jaci Burton, "**Perfect Play"**, 1st Edition, Feb 1st 2011, series 1.
4. Silva Mehta, Mira Mehta and Shyam Mehta, **"Yoga: The Iyengar Way",** Published by Knopp, 7th April, 1990.
5. Vishnu-Devananda, **"The Complete Illustrated Book of Yoga",** 18th April, 1995.
6. Timothy McCall, **"Yoga as Medicine: The Yogic Prescription for Health and Healing",** published by Harmony, 31st July 2007.
7. Rashmi Bansal, "**Stay Hungry Stay Foolish",** 1st December 2008.
8. Beverly Schwartz, "**Rippling: How Social Entrepreneurs Spread Innovation Throughout the World"**, Published by Jossey – Bass, May 27th 2012.

E-RESOURCES:
1. http://nptel.ac.in/courses/109106059/11
2. http://nptel.ac.in/courses/109106059/12
3. http://nptel.ac.in/courses/109106059/13
4. http://nptel.ac.in/courses/109106059/14

Course Outcomes:
At the end of the course, students will able to:
1. Understand the concepts of National Service Scheme (NSS) and its activities.
2. Gain the essence of volunteerism and shramdan
3. Understand the rules and procedures of physical education and its events.
4. Learn the basics of yoga and its benefits to the youth in personality development.
5. Gain the knowledge of managing the environmental issues and self-defense activities.

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80B09	**PROBABILITY AND STATISTICS** (Common for ME, CSE,IT and Min.E)	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic Probability
Course Objectives:
This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes, decision making and would come in handy for the prospective engineers in most branches.

Module - I: Probability [09 Periods]
Introduction to Probability, events, sample space, mutually exclusive events, Exhaustive events, Addition theorem for 2& n events and their related problems. Dependent and Independent events, conditional probability, multiplication theorem , Baye's Theorem, Statement of Weak law of large numbers

Module - II: Random Variables and Probability Distributions [10 Periods]
Random variables – Discrete Probability distributions. Bernoulli, Binomial, poisson, mean, variance, moment generating function–related problems. Geometric distributions.Continuous probability distribution, Normal distribution, Exponential Distribution, mean, variance, moment generating function–related problems. Gamma distributions (Only mean and Variance) Central Limit Theorem

Module - III: Sampling Distributions & Testing of Hypothesis [11 Periods]
A: Sampling Distributions: Definitions of population-sampling-statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation.
B: Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One tailed test, two tailed test.
Large sample tests:
 1. Testing of significance for single proportion.
 2. Testing of significance for difference of proportion.
 3. Testing of significance for single mean.
 4. Testing of significance for difference of means.

Module IV: Small sample tests [09 Periods]
Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples, Paired t-test, Snedecor's F- distribution and it's properties. Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit and independence of attributes.

Module V: Correlation, Regression: [09 Periods]

Correlation & Regression: Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression.

TEXT BOOKS:
1. Walpole, Probability & Statistics, for Engineers & Scientists, 8th Edition, Pearson Education.
2. Paul A Maeyer Introductory Probability and Statistical Applications, John Wiley Publicaitons.
3. Monte Gomery, "Applied Statistics and Probability for Engineers", 6th Edition, Wiley Publications.

REFERENCES:
1. Sheldon M Ross, Introduction to Probability & Statistics, for Engineers & Scientists, 5th Edition, Academic Press.
2. Miller & Freund's , Probability & Statistics, for Engineers & Scientists, 6th Edition, Pearson Education.
3. Murray R Spiegel, Probability & Statistics, Schaum's Outlines, 2nd Edition, Tata Mc. Graw Hill Publications.
4. S Palaniammal, Probability & Queuing Theory, 1st Edition, Printice Hall.

E-RESOURCES:
1. http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf (Probability & Statistics for Engineers & Scientists text book)
2. http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf (Random variables and its distributions)
3. http://users.wfu.edu/cottrell/ecn215/sampling.pdf (Notes on Sampling and hypothesis testing)
4. http://nptel.ac.in/courses/117105085/ (Introduction to theory of probability)
5. http://nptel.ac.in/courses/117105085/9 (Mean and variance of random variables)
6. http://nptel.ac.in/courses/111105041/33 (Testing of hypothesis)
7. http://nptel.ac.in/courses/110106064/5 (Measures of Dispersion)

Course Outcomes:
At the end of the course, students will able to:
1. The students will understand central tendency and variability for the given data.
2. Students would be able to find the Probability in certain realistic situation.
3. Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables Involved in the probability models. It is quite useful for all branches of engineering.
4. The student would be able to calculate mean and proportions (large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations.
5. The student would be able to calculate mean and proportions (small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	4		3					3	1
CO2	3	3	2		3			2	1		2	
CO3	3	2	1		3					2	3	
CO4	3	3	2		2		1		1			1
CO5	3	2	2									

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80505	DISCRETE MATHEMATICS (Common for CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course provides the concepts of mathematical logic demonstrate predicate logic and Binary Relations among different variables, discuss different type of functions and concepts of Algebraic system and its properties. It also evaluates techniques of Combinatorics based on counting methods and analyzes the concepts of Generating functions to solve Recurrence equations.

MODULE I: Mathematical Logic [10 Periods]

Basic Logics - Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology.

Implications and Quantifiers - Equivalence implication, Normal forms, Quantifiers, Universal quantifiers.

MODULE II: Predicate Logic and Relations [10 Periods]

Predicate Logic - Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.

Relations - Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

MODULE III: Functions and Algebraic Structures [10 Periods]

A: Functions - Inverse Function, Composition of functions, recursive Functions - Lattice and its Properties.

B: Algebraic structures - Algebraic systems Examples and general properties, Semi-groups and monoids, groups, sub-groups, homomorphism, Isomorphism, Lattice as POSET, Boolean algebra.

MODULE IV: Counting Techniques and Theorems [09 Periods]

Counting Techniques - Basis of counting, Combinations and Permutations with repetitions, Constrained repetitions

Counting Theorems - Binomial Coefficients, Binomial and Multinomial theorems, principles of Inclusion – Exclusion. Pigeon hole principle and its applications.

MODULE V: Generating functions and Recurrence Relation [09 Periods]

Generating Functions - Generating Functions, Function of Sequences, Calculating Coefficient of generating function.

Recurrence Relations - Recurrence relations, Solving recurrence relation by substitution and Generating functions. Method of Characteristics roots, solution of Non-homogeneous Recurrence Relations.

TEXT BOOKS:
1. J P Tremblay & R Manohar, "**Discrete Mathematics with applications to Computer Science**", Tata McGraw Hill.
2. J.L. Mott, A. Kandel, T.P.Baker "**Discrete Mathematics for Computer Scientists & Mathematicians**", PHI.

REFERENCES:
1. Kenneth H. Rosen, "**Discrete Mathematics and its Applications**", TMH, Fifth Edition.
2. Thomas Koshy, "**Discrete Mathematics with Applications**", Elsevier.
3. Grass Man & Trembley, "**Logic and Discrete Mathematics**", Pearson Education.
4. C L Liu, D P Nohapatra, "**Elements of Discrete Mathematics** - **A Computer Oriented Approach**", Tata McGraw Hill, Third Edition.

E-RESOURCES:
1. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf
2. http://www.medellin.unal.edu.co/~curmat/matdiscretas/doc/Epp.pdf
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xPG734QA9tMJN2 ncqS12ZbN7pUSSlWCxSgPOZJEokyWJlxQLYsrFyeITA70W9C8Pg
4. http://nptel.ac.in/courses/106106094/

Course Outcomes:
At the end of the course, a student will be able to
1. **Apply** the concepts of connectives and normal forms in real time applications.
2. **Summarize** predicate logic, relations and their operations.
3. **Describe** functions, algebraic systems, groups and Boolean algebra.
4. **Illustrate** practical applications of basic counting principles, permutations, combinations, and the pigeonhole methodology.
5. **Analyze** techniques of generating functions and recurrence relations.

	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2				3							2	3		
CO2	3											2	3		
CO3		3										2	3		
CO4	3	3	2	3								2		3	
CO5					3							2		3	

Prerequisites: Basic Hardware Knowledge
Course Objectives:
This course used to recognize the basic structure and operation of a digital computer, understand the instruction formats, addressing modes, I/O and interrupts, study the micro programmed control and hierarchy of memory system, operations of the arithmetic unit and concepts related to the input-output organization and analyze processor performance improvement using instruction level parallelism and operations in pipeline design.

MODULE I: Structure of Computers and Micro Operations   [09 Periods]
Number Systems and Structure of Computers – Number Systems, Introduction to Combinational Circuits: Encoder, Decoder, Multiplexer, Demultiplexer, Introduction to Sequential Circuits. Computer types, Functional unit, Basic Operational Concepts, Bus Structures, Multi Processors and Multi Computers.
Micro Operations - Register Transfer, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic logic Shift Unit.

MODULE II: Computer Organization and Design, CPU   [09 Periods]
Computer Organization and Design - Instruction Codes, Computer Registers, Computer Instructions – Instruction Cycle, Memory Reference instructions, Input-Output and Interrupt.
Central Processing Unit - Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, CISC and RISC.

MODULE III: Micro Programmed Control and Memory Organization
[09Periods]
A:Micro Programmed Control - Control memory, Address Sequencing, Micro Program Example, Design of Control Unit, Hardwired Control and Micro Programmed Control.
B: Memory Organization - Memory Hierarchy, Main Memory - RAM and ROM Chips, Cache Memory, Performance Considerations, Virtual Memory, Secondary Storage.

MODULE IV: Computer Arithmetic and I/O Organization   [12 Periods]
Computer Arithmetic - Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point arithmetic operations, BCD adder.
I/O Organization - Peripheral devices, Input-Output interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt and Direct Memory Access.

MODULE V: Pipeline and Vector Processing   [09 Periods]
Pipeline - Parallel Processing, Pipeline: Arithmetic, Instruction and RISC.

Processing - Vector Processing - Characteristics of vector processing, Instruction format for vector processing. Array Processors - Attached array processor organization, SIMD array processor organization.

TEXT BOOKS:
1. Carl Hamacher, Zvonko Vranesic, Safeazaky, "**Computer Organization**", Mc Graw Hill, 5th edition, 2002.
2. M. Morris Mano, "**Computer System Architecture**", Pearson/PHI, 3rd edition, 2008.

REFERENCES:
1. William Stallings, "**Computer Organization and Architecture**", 6th edition, Pearson/PHI, 2003.
2. Sivarama Dandamudi, "**Fundamentals of Computer Organization and Design**", Springer,2003.
3. John L. Hennessy and David A Patterson, "**Computer Architecture a Quantitative approach**", 4th edition, Elsevier, 2007.
4. Joseph D/Dumas II, "**Computer Architecture Fundamentals and Principles of Computer Design**", BS Publication, 2005.

E-RESOURCES;
1. https://books.google.co.in/books?isbn=8131700704
2. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7- Eh9eBOsT1ELo YpKlg_xngrkluevXOJL-s1TbxS8q2icgUs3hL4_KAi5So5FgXcVg
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xAYUzYSlXl4znu dlsolr-e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc_70rWMEwQ
4. http://nptel.ac.in/courses/106106092/

Course Outcomes:
At the end of the course, students will be able to
1. **Develop** the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
2. **Classify** the impact of instruction set architecture of computer design.
3. **Design** memory organization and control unit operations.
4. **Evaluate** computer arithmetic operations of binary number system and different hardware components associated with the input-output organization.
5. **Ability** to conceptualize instruction level parallelism and pipeline.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1									2	3	2	
CO2		2	3									1			
CO3	2	2	3									2			
CO4	3														
CO5	3														

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80507	OPERATING SYSTEMS (Common for CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

MODULE I: Computer System and Operating System Overview   [10 Periods]
Basic System and Process Operations - Overview of Computer System hardware, Operating System Objectives and services, Operating System Structure, System Calls, System Programs.
Process Management - Process Description, Process Control Block, Process States, Inter-process Communication.

MODULE II: Scheduling and Concurrency   [10 Periods]
CPU Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation, Threads Overview, Threading issues.
Concurrency - Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, monitors, classic problems of synchronization.

MODULE III: Deadlocks   [08 Periods]
A: Deadlocks - System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention.
B: Detection and Recovery - Deadlock avoidance, Deadlock detection, Recovery from Deadlocks.

MODULE IV: Memory   [12 Periods]
Memory Management -Basic concepts, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page-replacement algorithms, Thrashing.
Secondary Storage Structure and I/O Systems - Disk structure; Disk scheduling, Disk management, Swap space Management, RAID structure, Stable storage Implementation, Tertiary Storage Structure, I/O hardware, Application I/O interface, Kernel I/O subsystem.

MODULE V: Files   [08 Periods]
File Management -   File system-File concepts, Access methods, Directory structure, File system mounting, File sharing and Protection. Implementing file systems-File system structure and implementation, Directory implementation, Allocation methods, Free-space management, Efficiency and performance.
Security - Protection, Security threats, Viruses, Cryptography as a security tool.

TEXT BOOKS:
1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, **"Operating System Principles"** 7th Edition, John Wiley.
2. Stallings, **"Operating Systems Internal and Design Principles",** 5th Edition, 2005, Pearson education/PHI

REFERENCES:
1. Crowley, **"Operating System a Design Approach",** TMH.
2. Andrew S Tanenbaum, **"Modern Operating Systems",** 2nd edition Pearson/PHI.
3. Pramod Chandra P. Bhat**, "An Introduction to Operating Systems, Concepts and Practice"**, PHI, 2003
4. DM Dhamdhere**, "Operating Systems: A concept based approach"**, 2nd Edition, TMH

E-RESOURCES:
1. https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf
2. https://archive.org/details/2005OperatingSystemConcepts7thEditionAbrahamSilberschatz
3. https://ndl.iitkgp.ac.in/document/BN1jh1UjGAJr_Zl4CiGeVCT3CaRCi4AlvzVWgkNQLQcFt_lb03ZmqLHrc1tBe3aA6pjyl3jlrBqPLRxX2VQUvQ
4. http://nptel.ac.in/courses/106108101/

Course Outcomes:
At the end of the course, students will be able to
1. **Determine** the role of Operating System in a computer.
2. **Relate** the methods for providing concurrency, communication and synchronization among concurrent tasks.
3. **Illustrate** the schemes used to address the issues of deadlocks.
4. **Contrast** different memory management techniques.
5. **Examine** various file management strategies and security issues.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak — Programme Outcomes(POs) / PSOs

Prerequisites: Computer Programming

Course Objectives:

This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

MODULE I: OOP concepts & Introduction to C++, Java   [09 Periods]

OOP concepts & Introduction to C++ - Introduction to object oriented concepts : Object, class, methods, instance variables; C++ program structure; Standard Libraries; accessing class data members; Overview of Inheritance, Overloading, Polymorphism, Abstraction, Encapsulation and Interfaces.

Introduction to Java - History of JAVA, Java buzzwords, data types, variables, scope and life time of variable, arrays, operators, expressions, control statements ,type conversion and type casting, simple Java program.

MODULE II: Basics of JAVA   [09 Periods]

Classes and Objects - Concepts of classes, Objects, constructors, methods, this key word , garbage collection overloading methods, constructors parameter passing ,recursion. String handling: string, string buffer, string tokenizer.

Inheritance - Base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

MODULE III: Interfaces and Exception Handling   [12 Periods]

A: Interfaces - Defining an interface, implementing interface, differences between classes and interfaces, extending interfaces. Packages - Defining, creating and accessing a package, importing packages, access control, exploring package-java.io.

B: Exception handling - Concepts of Exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of try, catch , throw, throws and finally, built-in exceptions, creating own exception subclasses.

MODULE IV: Multithreading and Event handling   [09 Periods]

Multithreading - Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Event handling - Events, Event sources, event classes, event listeners, delegation event model, handling mouse and keyboard events, adapter classes, AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists.

MODULE V: Layout manager and Swings   [09 Periods]

Layout manager - Layout manager types-border, grid, flow, card and grid bag.

Swings - Introduction, limitations of AWT, components, containers, exploring swing-JApplet, JFrame and JComponent,Icons and Labels, TextFields, buttons – the JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, ScrollPanes, Trees and Tables.

TEXT BOOKS:
1. Herbert Schildt, "**Java The complete reference**", TMH, 8th edition
2. T. Budd, "**Understanding OOP with Java**", updated edition, Pearson Education.
3. Joyce Farrell, Cengage , "**Object Oriented Programming C++**", 4th Edition, 2013.

REFERENCES:
1. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Orientd Programming through Java**", Universities Press.
3. S. Malhotra and S. Choudhary, "**Programming in Java**", Oxford Univ. Press.
4. Bruce Eckel, "**Programming in Java**", Pearson Education.
5. Herbert Schildt , "**The Complete Reference, C++**", TMH, 4th edition.

E-RESOURCES:
1. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-RPf64_TFk2i4LJhgQFPQWAEt-Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi_mMQ
2. https://ndl.iitkgp.ac.in/result?q={"t":"search","k":"object%20oriented%20programming","s":["type=\"video\""],"b":{"filters":[]}}
3. http://www.rehancodes.com/files/oop-using-c++-by-joyce-farrell.pdf
4. http://www.nptel.ac.in/courses/106103115/36

Course Outcomes:
At the end of the course, students will be able to
1. **Differentiate** structured programming and object oriented programming and know the concepts of classes, objects, members of a class.
2. **Apply** object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.
3. **Capable** of handling run time errors using Exceptional Handling and develop applications for concurrent processing using Thread Concept.
4. **Design** Applets that take user response through various peripheral devices such as mouse and keyboard by event handling mechanism.
5. **Design** interactive applications for use on internet.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO- PO,PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
				Programme Outcomes(POs)									PSOs		
CO1		3	2										3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	
CO4			3		3									3	
CO5		2	2		3								3	2	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester		
Code: 80601	**IT WORKSHOP** (Common for CSE and IT)		**L**	**T**	**P**
Credits: 1			**-**	**-**	**2**

Pre requisites: NIL

Course Objectives:

- The IT Workshop is a training lab course to get training on PC Hardware, Internet & World Wide Web, and Productivity tools for documentation, Spreadsheet computations, and Presentation.
- To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers, hardware and software level troubleshooting process.
- To introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, newsgroups and discussion forums. To get knowledge in awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks.
- To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools and LaTeX.

PC Hardware:

The students should work on working PC to disassemble and assemble to working condition and install operating system like Linux or any other on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Problem 1:

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

Problem 2:

Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

Problem 3:

Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Problem 4:
Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. Internet & World Wide Web.

Problem 5:
Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

Problem 6:
Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Problem 7:
Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

Problem 8:
Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Problem 9:
Develop home page: Student should learn to develop his/her home page using HTML consisting of his/her photo, name, address and education details as a table and his/her skill set as a list.
Productivity tools: LaTeX and Word Word Orientation: An overview of LaTeX and Microsoft (MS) office / equivalent (FOSS) tool word should be learned: Importance of LaTeX and MS office / equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that should be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Problem 10:
Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Problem 11:
Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Problem 12:
Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs in word.

Problem 13 :

Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler:-Gridlines, Format Cells, Summation, auto fill, Formatting Text

Problem 14:

Calculating GPA -.Features to be covered:-Cell Referencing, Formulae in spreadsheet –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, Sorting, Conditional formatting.

Problem 15:

Creating Power Point: Student should work on basic power point utilities and tools in Latex and Ms Office/equivalent (FOSS) which help them create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows,Hyperlinks, Inserting Images, Tables and Charts

REFERENCE BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion –Leslie Lamport, PHI/Pearson.
3. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
4. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme.–CISCO Press, Pearson Education.
5. PC Hardware and A+ Handbook –Kate J. Chase PHI (Microso

Course Outcomes:

1. Apply knowledge for computer assembling and software installation.
2. Ability how to solve the trouble shooting problems.
3. Apply the tools for preparation of PPT, Documentation and budget sheet etc.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	1		3							3	2		
CO2	3	3	1		3							3	2		
CO3	3	3	1		3							3	2		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80509	**OPERATING SYSTEMS LAB**	**L**	**T**	**P**
Credits: 2	**(Common for CSE and IT)**	**-**	**1**	**2**

Prerequisites: NIL
Course Objectives:
This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

Software Requirements: C++/JDK

List of Programs:
1. Simulate the following CPU scheduling algorithms
    a) FCFS b) SJF
2. Simulate the following CPU scheduling algorithms
    a) Priority b) Round Robin
3. Simulate the Producer Consumer Problem
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate MVT and MFT techniques.
6. Simulate Paging Technique of memory management
7. Simulate page replacement algorithms a) FIFO b) LRU c) Optimal
8. Simulate the following Disk Scheduling Algorithms
    (a) First Come-First Serve (FCFS)
    (b) Shortest Seek Time First (SSTF)
9. Simulate the following Disk Scheduling Algorithms
    (a) Elevator (SCAN)
    (b) LOOK
10. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked
11. Simulate File Organization Techniques
    a) Single level directory b) Two level
12. Simulate File Organization Techniques
    a) Hierarchical b) DAG

TEXT BOOKS:
1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, **"Operating System Principles"** 7th Edition, John Wiley.
2. Stallings **"Operating Systems Internal and Design Principles",** Fifth Edition-2005, Pearson education/PHI

REFERENCES:
1. Crowley ,**"Operating System A Design Approach",**TMH.
2. Andrew S Tanenbaum ,**"Modern Operating Systems",** 2nd edition Pearson/PHI.
3. Pramod Chandra P. Bhat**, "An Introduction to Operating Systems"**, Concepts and Practice", PHI, 2003

4. DM Dhamdhere**, "Operating Systems A concept based approach"** ,2nd Edition, TMH

Course Outcomes:
At the end of the course, students will be able to
1. **Implement** various CPU scheduling algorithms, Bankers algorithms used for deadlock avoidance and prevention.
2. **Develop** disk scheduling algorithms and apply File organization techniques.
3. **Simulate** file allocation method

<table>
<tr><th colspan="16">CO- PO,PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td>2</td><td>3</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td></td><td></td></tr>
<tr><td>CO2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td></td><td></td></tr>
<tr><td>CO3</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td></td><td></td></tr>
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2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80510	**JAVA PROGRAMMING LAB** (Common for CSE and IT)	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL
Course Objectives:
This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

Software Requirements: Java

List of Programs:

1. Write Java Programs that implement the following..
a) Constructor
b) Parameterized constructor
c) Method overloading
d) Constructor overloading

2. Write a Java program
a) checks whether a given string is a palindrome or not.
b) for sorting a given list of names in ascending order.
c) that reads a line if integers and then displays each integer and the sum of all integers(use string tokenizer class of java.util).

3. Write Java programs that uses the following keywords…
a) this
b) super
c) static
d) final

4. Write a Java program to implement
a) Method overloading.
b) dynamic method dispatch.
c) multiple inheritance.
d) access specifiers.

5. Write a Java program that
a) reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
b) reads a file and displays the file on the screen, with a line number before each line.

c) displays the number of characters, lines and words in a test file.

6. Write a Java program for handling
   a) Checked exceptions.
   b) unchecked exceptions.

7. Write a Java program
   a) Creates three threads. First threads displays "Good Morning "for every one Second, the second thread displays "Hello" for every two seconds, the third thread
      Displays "Welcome" for every three seconds.
   b) that correctly implements producer consumer problem using concept of inter thread communication.

8. Develop an Applet that
   a) Displays a simple message.
   b) receives an integer in one text field, and computes its factorial value and returns it in
      another text field , when the button named " Compute" is clicked.

9. Write a Java program that works as a simple calculator. Use a grid layout to arrange
   buttons for the digits and for the +,-,*,/ operations. Add a text field to display the result.

10. Write a Java program for handling
    a) mouse events.
    b) key events.

11. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields num1 and num2. The division of num1 and num2 is displayed in the result field when the divide button is clicked. If num1 or num2 were not an integer, the program would throw number format exception. If num2 were zero, the program would throw an arithmetic exception and display the exception in the message dialogue box.

12. Write a Java program that
    a) Simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on and only one light can be on at a time. No light is on when the program starts.
    b) Allows the user to draw lines rectangles and ovals.

TEXT BOOKS:
1. Herbert Schildt, "**Java The complete reference**", TMH, 8th edition, 2011.
2. T. Budd, "**Understanding OOP with Java**", Pearson Education, updated edition, 1998.

REFERENCES:

1. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Oriented Programming through Java**", Universities Press.
3. Bruce Eckel," **Programming in Java**", Pearson Education.
4. S. Malhotra and S. Choudhary," **Programming in Java**", Oxford Univ. Press.

Course Outcomes:

At the end of the course, students will be able to

1. **Build** simple java progras using the basic concepts of OOP
2. **Create** user defined packages to build real time applications
3. **Develop** applications on files, exceptions, threads and applets.
4. **Construct** GUI based applications.
5. **Design** Interactive applications for use on internet.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3										3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	
CO4			3		3									2	
CO5		2	2		3								2	2	

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80M02	GENDER SENSITIZATION (Common for EEE,ECE,CSE and IT)	L	T	P
Credits: NIL		2	-	-

Prerequisites: NIL

Course Objectives:
To develop students' sensibility with regard to issues of gender in contemporary India.To provide a critical perspective on the socialization of men and women.To introduce students to information about some key biological aspects of genders.To expose the students to debates on the politics and economics of work.To help students reflect critically on gender violence.To expose students to more egalitarian interactions between men and women.

MODULE I: UNDERSTANDING GENDER   [06 Periods]
Gender: Why Should We Study It? *(Towards a World of Equals: Unit -1)*
Socialization: Making Women, Making Men *(Towards a World of Equals: Unit -2)*
Introduction. Preparing for Womanhood. Growing up Male. First Lessons in Caste. Different Masculinities.
Just Relationships: Being Together as Equals *(Towards a World of Equals: Unit -2)*
Mary iKorn and Onler. Love and Acid just do not Mix. Love Letters. Mothers aniJ Fathers. Further Reading: Rosa Parks-The Brave Heart.

MODULE II: GENDER AND BIOLOGY   [06 Periods]
Missing Women: Sex Selection and Its Consequences *(Towards a World of Equals: Unit -4)* Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary *(Towards a World of Equals: Unit -10)*
Two or Many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health *(Towards a World of Equals: Unit -13)*

MODULE III: GENDER AND LABOUR   [07 Periods]
A: Housework: the Invisible Labour *(Towards a World of Equals: Unit -3)*
"My Mother doesn't Work." "Share the I.oad."
B: Women's Work: Its Politics and Economics *(Towards a World of Equals: Unit -7)*
Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

MODULE IV: ISSUES OF VIOLENCE   [07 Periods]
Sexual Harassment: Say Nol *(Towards a World of Equals: Unit -6)*
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chdpulum. Domestic Violence: Speaking Out *(Towards a World of Equals: Unit -5)*
Is Home a Safe Place? When Women Unite (Film" Rebuilding Lives. Further Reading: New Forums for Justice. Thinking about Sexual Violence *(Towards a World of Equals: Unit -11)*
Blaming the Victim-1 Fought for my Life...." - Further Reading: The Caste Face of Violence.

MODULE V: GENDER STUDIES   **[06 Periods]**

Knowledge: Through the Lens of Gender *(Towards a Work/ of Equals: Unit -5)*
Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.
Whose History? Questions for Historians and Others *(Towards a World of Equals: Unit -9)*
Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.
Essential Reading: All the Units In the Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Mina Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Thant

Note: Since it Is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

TEXT BOOKS:
1. Towards a World of Equals: A bilingual Textbook on Gender , A Suneetha -etall

REFERENCES:
1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
2. Tripti Lahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by -the-numbers-where-Indan-womenworkP
3. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp?Flook Cndet,3732
4. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-RESOURCES:
1. http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm (UNDERSTANDING GENDER)
2. https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)
3. http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ (GENDER AND LABOUR)
4. http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004 (ISSUES OF VIOLENCE)

5. http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

Course Outcomes:

At the end of the course, students will be able to

1. **Develop** a better understanding of important issues related to gender in contemporary India.
2. **Sensitize** about the basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. **Attain** a finer grasp of how gender discrimination works in our society and how to counter it.
4. **Acquire** insight into the gendered division of labour and its relation to politics and economics.
5. **Develop** a sense of appreciation of women in all walks of life.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						3		3	3		2	3
CO2						3		3	3		2	3
CO3						3		3	3		2	3
CO4						3		3	3		2	3
CO5						3		3	3		2	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80A02	**INTERNSHIP - I**	**L**	**T**	**P**
Credits: NIL		**-**	**-**	**-**

Prerequisites: NIL

Course Objectives:
Student will be able to learn fundamental aspects of Software Engineering and analyze various process models. To identify various types of requirements and the process for Requirements Engineering. To make use of various System Models to conceptualize and construct a system. To demonstrate different testing tactics and define metrics for software measurement. To classify and mitigate the Software Risks and learn to achieve quality standards.

Module I: Introduction to Software Engineering   [09 Periods]
Basics terms of Software Engineering: Evolving role of software, changing nature of Software, Software Myths. A Generic View of Process:-Software engineering-A layered technology, The Capability Maturity Model Integration (CMMI)
Process Models: The water fall model, Incremental process models, evolutionary process models, and the unified process.

Module II: Requirements of Software Engineering   [09Periods]
Software Requirements: Functional and non functional requirements, User requirements, System requirements, Interface specification, The software requirements document.
Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management

Module III: Phases of Software Engineering   [09 Periods]
A: System Models: Context models, Behavioral models, Data models, Object models, Structured methods
B: Design Engineering: Design process and design quality, design concepts the design model
Creating an architectural design: Software architecture, data design, architectural styles and patterns, architectural design

Module IV: Test Strategies   [09 Periods]
Methods of Testing: A strategic approach to software testing, Black box and White box Testing, Validation Testing, System Testing.
Product Metrics: Software Quality, Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance
Metrics for process and products: Software measurement, Metrics for software quality

Module V: Risk Management   [09Periods]
Management of Risk Process: Reactive Vs proactive risk strategies, Software risks, Risk identification, Risk projection Risk refinement, RMMM, RMMM plan

Quality Management: Quality concepts, Software quality assurance, Software reviews, Formal technical reviews, Statistical Software Quality Assurance, Software Reliability, ISO 9000 Quality standards

TEXT BOOKS:
1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw Hill International Edition, 5th edition, 2001.
2. Ian Summerville, Software engineering, Pearson education Asia, 6th edition,2000.

REFERENCES:
1. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag,1997.
2. James F Peters and WitoldPedryez, ‒Software Engineering – An Engineering Approach, John Wiley and Sons, New Delhi,2000.
3. AliBehforooz and Frederick J Hudson, ‒Software Engineering Fundamentals, Oxford University Press, New Delhi,1996.

E RESOURCES:
1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false
2. https://books.google.co.in/books?id=PqsWaBkFh1wC&printsec=frontcover&dq=software+engineering+by+ian+sommerville+FREE+download&hl=en&sa=X&ved=0ahUKEwjjv5fhpb_TAhUHOo8KHY5OAC4Q6AEIKjAB#v=onepage&q=software%20engineering%20by%20ian%20sommerville%20FREE%20download&f=false
3. http://ieeexplore.ieee.org/document/4807670/
4. https://link.springer.com/search?facet-journal id=40411&package=open accessarticles&query=&facet-sub-discipline=%22Software+Engineering%22
5. http://freevideolectures.com/Course/2318/Software-Engineering
6. http://freevideolectures.com/Course/2318/Software-Engineering/5

Course Outcomes:
At the end of the course, students will be able to:
1. **Analyze** the customer business requirements and choose the appropriate Process model for the given project
2. **Elicit** functional and non-functional requirements using rigorous engineering methodology
3. **Conceptualize** and achieve requirements defined for the system using Architectural styles and Design patterns
4. **Design** test cases and define metrics for standardization.
5. **Assess**, mitigate and monitor the risks and assuring quality standards

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3			3		3
CO2	2	3								3			3	2	
CO3			3	3						2				3	
CO4				2	3								2		
CO5						2	3	3					3	3	

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80512	DATABASE MANAGEMENT SYSTEMS (Common for CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course enables the students to learn the basic concepts and the applications of Data Base Systems and conceptualize and depict a Data Base System using ER diagram, master in constructing queries using SQL. Using this course student can understand relational database principles, become familiar with the basic issues of transaction processing and concurrency control and Data Base storage structures and access techniques.

MODULE I: Introduction: [10 Periods]

Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.

Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

MODULE II: Relational Algebra and Calculus: [09 Periods]

Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.

SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases.

MODULE III: Schema Refinement and Normal Forms: [10 Periods]

A: Schema Refinement - Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs,

B: Normal Forms- Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

MODULE IV: Transaction Management and Concurrency Control: [10 Periods]

Transaction Management:-Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multi version Schemes.

Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems..

MODULE V: Storage and Indexing: **[09 Periods]**

Storage- Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations. Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOKS:
1. Data base Management Systems, Raghu Rama krishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition.
2. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited l, 6th edition

REFERENCES:
1. Database Systems, 6th edition, R Elmasri, ShamkantB.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C. J. Date, Pearson Education.

E-RESOURCES:
1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+retri eval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Course Outcomes:
At the end of the course, students will be able to
1. **Identify** and define the data models needed to design a database.
2. **Write** queries in SQL for database creation and maintenance.
3. **Analyze** functional dependencies for designing a robust database.
4. **Implement** transactions, concurrency control, recovery and Query optimization techniques.
5. **Compare** various indexing and hashing techniques.

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester	
Code: 80602	WEB TECHNOLOGIES (Common for CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Object Oriented Programming

Course Objectives:

This course enables the students to identify the fundamental concepts for developing web application using PHP language for server side scripting, analyze how data can be transported using XML, developing a web application with Server side programming using JavaServlets & JSP and Client side scripting with JavaScript and AJAX.

MODULE– I [10 Periods]

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories

MODULE – II [09 Periods]

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML **Parsing XML Data** – DOM and SAX Parsers in java.

MODULE – III [10 Periods]

A: Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a servlet.

B: The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

MODULE – IV [09 Periods]

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

MODULE- V [10 Periods]

Client side Scripting: Introduction to Javascript: Javascript language – declaring variables,scope of variables, functions, event handlers (onclick, onsubmit etc.), Document Object Model, Form validation. Simple AJAX application.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press

2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCES:
1. Web Programming, building internet applications, Chris Bates 2nd edition, WileyDreamtech
2. Java Server Pages –Hans Bergsten, SPD O'Reilly
3. Java Script, D. Flanagan, O'Reilly,SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming World Wide Web, R. W. Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson

E-RESOURCES:
1. https://www.w3schools.com/html/
2. https://www.javatpoint.com/servlet-tutorial
3. https://ndl.iitkgp.ac.in/result?q={%22t%22:%22search%22,%22k%22:%22web%20technologies%22,%22s%22:[],%22b%22:{%22filters%22:[]}}
4. http://nptel.ac.in/courses/106105084/

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** the concepts of client side scripting, validation of forms and AJAX programming
2. **Identify** the role of server side scripting with PHP language.
3. **Create** web pages using XML and explore how to parse and use XML Data with Java.
4. **Design** dynamic web application using Server side programming with Java Servlets and JSP.
5. **Contrast** on how to connect and retrieve data through a web page from database using JDBC.

COs	CO- PO,PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		2	2				2		3	2	3	3
CO2			3		2	2				2		3	2	3	3
CO3			3		2	2				2		3	2	3	3
CO4			3		2	2				2		3	2	3	3
CO5			3		2	2				2		3	2	3	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80513	FORMAL LANGUAGES AND AUTOMATA THEORY	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course enable the students to define basic properties of formal languages, explain the Regular languages and grammars, inter conversion, Normalizing CFG , describe the context free grammars, minimization of CNF, GNF and PDA , designing Turing Machines and types of Turing Machines, church's hypothesis counter machines, LBA, P & NP problems and LR grammar.

MODULE I: Introduction   [10 Periods]
Basics of Formal Languages - Strings, Alphabet, Language, Operations, Chomsky hierarchy of languages, Finite state machine Definitions, finite automation model, acceptance of strings and languages.
NFA and DFA - DFA and NFA, transition diagrams and language recognizers. NFA with ε transitions –Equivalence between NFA with and without ε transitions, NFA to DFA conversion, minimization FSM, equivalence between two FSM's, Output machines- Moore and Mealy machine.

MODULE II: Regular Languages   [10 Periods]
Representation of Regular Expressions - Regular Sets, Regular Expressions, identity Rules, Constructing Finite automata for the given regular expressions, Conversion of Finite automata to regular expressions.
Pumping Lemma -   Pumping lemma of regular sets, closure properties of regular sets (proofs not required). Regular Grammars – right linear and left linear grammars, equivalence between regular grammar and FA.

MODULE III: CNF and PDA   [10 Periods]
A: Context Free Grammar - Derivation trees, sentential forms, right most and left most derivations of strings. Ambiguity in Context frees Grammars. Minimization of Context free grammars, CNF, GNF, Pumping Lemma for Context Free Languages. Enumeration properties of CFL (proofs not required).
B: Push Down Automata - Definition, model, acceptance of CFL, Acceptance by final state, acceptance by empty state and its equivalence, Equivalence of CFL and PDA (proofs not required), Introduction to DCFL and DPDA.

MODULE IV: Computable Functions   [09 Periods]
Turing Machine - Definition, model, Design of TM, computable functions.
Recursive Enumerable Languages and Theorems - Recursively enumerable languages, Church's hypothesis, counter machine, types of Turing Machines (proofs not required)

MODULE V: Computability Theory   [09 Periods]

Linear Bounded Automata - Linear Bounded Automata and context sensitive languages, LR (0) grammar, decidability of problems, Universal TM.

P and NP Problems - Undecidable problems about Turing Machine – Post's Correspondence Problem, The classes P and NP.

TEXT BOOKS:
1. H.E.Hopcroft, R.Motwani and J.D Ullman, **"Introduction to Automata Theory, Languages and Computations"**, Second Edition, Pearson Education, 2003.
2. KVN SUNITHA N Kalyani, "**Formal languages and Automata Theory",** Pearson Education

REFERENCES:
1. H.R.Lewis and C.H.Papadimitriou, **"Elements of The theory of Computation"**, Second Edition, Pearson Education/PHI, 2003
2. J.Martin, **"Introduction to Languages and the Theory of Computation"**, Third Edition, TMH, 2003.
3. Micheal Sipser, **"Introduction of the Theory and Computation"**, Thomson Brokecole, 1997.

E-RESOURCES:
1. https://books.google.co.in/books?isbn=8184313020
2. https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf
3. http://www.jalc.de/
4. https://arxiv.org/list/cs.FL/0906
5. http://freevideolectures.com/Course/3379/Formal-Languages-and-Automata-Theory
6. http://nptel.ac.in/courses/111103016/

Course Outcomes:
At the end of the course, students will be able to
 1. **Define** the theory of automata types of automata and FA with outputs.
 2. **Differentiate** regular languages and applying pumping lemma.
 3. **Classify** grammars checking ambiguity able to apply pumping lemma for CFL various types of PDA.
 4. **Illustrate** Turing machine concept and in turn the technique applied in computers.
 5. **Analyze** P vs NP- Class problems and NP-Hard vs NP-complete problems, LBA, LR Grammar, Counter machines, Decidability of Problems.

CO- PO,PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2									2	2	2	
CO2		2	2	2	2							2	2	2	
CO3		2	2	2	2							2	2	2	
CO4		2	2	2	2							2	2	2	
CO5		2	2	2	2							2	2	2	

Professional Elective - I

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code:80523	OBJECT ORIENTED ANALYSIS AND DESIGN [Professional Elective - I]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives: The student will be able to understand the Unified Modeling Language Principles and learns fundamental process pattern for object-oriented analysis and design.

Module I: UML   **[09 Periods]**
Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

Module II: Behavioral and structural Modeling   **[09 Periods]**
Basic Behavioral Modeling-I : Use cases, Use case Diagrams, Activity Diagrams.
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Module III: Behavioral Model II   **[12 Periods]**
A: Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.
B: Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.
Basic Behavioral Modeling-II : Interactions, Interaction diagrams

Module IV: Advanced Behavioral Modeling   **[09 Periods]**
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Module V: Architecture Modeling   **[09 Periods]**
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.
Case Study: The Unified Library application.

TEXT BOOKS:
1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

REFERENCES:
1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill.
3. Mark Priestley: Practical Object-Oriented Design with UML,TATA McGrawHill.
4. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.
Course Outcomes:

At the end of the course, students will be able to:
1. **Analyze** the requirements through Use-Case View
2. **Identify** all structural and behavioral concepts of the entire system
3. **Develop** a model using UML concepts by different types of diagrams like Use case diagram, Class Diagram, Sequence Diagram etc.
4. **Design** event ,process and state chart diagrams for the models
5. **Build** an application with object oriented analysis and design concepts.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3		2	2	2						2	2	2
CO2		3		3	2	2	1				2		3	2	2
CO3	2	3	3	2	2	2	2				1		3	3	2
CO4		3		2	2	2	2							3	
CO5		3		2	2	2	2							3	

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester		
Code: 80524	**NEURAL NETWORKS** [Professional Elective - I]		L	T	P
Credits: 3			3	-	-

Perquisite: NIL

Course Objectives: To understand the neural activities and learning process.

MODULE I: [09 Periods]
Basic Learning Algorithms: Biological Neuron – Artificial Neural Model – Types of Activation Functions – Architecture – Feed Forward and Feedback – Learning Process – Error Correction Learning – Memory Based Learning – Hebbian Learning – Competitive Learning – Boltzman Learning – Supervised and Unsupervised Learning – Learning Tasks – Pattern Space– Weight Space – Pattern Association – Pattern Recognition – Function Approximation – Control – Filtering – Beam forming – Memory – Adaptation – Statistical Learning Theory – Single Layer Perception – Perception Learning Algorithm– Perception Convergence Theorem – Least Mean Square Learning Algorithm – Multilayer Perception – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm

MODULE II: [09 Periods]
Radial Basis Function Networks and Support Vector Machines : Cover's Theorem on the Separability of Patterns – Exact Interpolator – Regularization Theory – Generalized Radial Basis Function Networks – Learning in Radial Basis Function Networks – Applications – XOR Problem – Image Classification
Support Vector Machines : Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns – Support Vector Machine for Pattern Recognition – XOR Problem – –insensitive Loss Function – Support Vector Machines for Nonlinear Regression

MODULE III: [12 Periods]
A: Committee Machines: Ensemble Averaging – Boosting – Associative Gaussian Mixture Model –Hierarchical Mixture of Experts Model (HME) – Model Selection using a Standard Decision Tree – Apriori and Posteriori Probabilities – Maximum Likelihood Estimation – Learning Strategies for the HME Model – EM Algorithm – Applications of EM Algorithm to HME Model
B: Neurodynamics Systems : Dynamical Systems – Attractors and Stability – Non–linear Dynamical Systems – Lyapunov Stability – Neurodynamical Systems – The Cohen–Grossberg Theorem

MODULE IV: [09 Periods]
Attractor Neural Networks : Associative Learning – Attractor Neural Network Associative Memory – Linear Associative Memory – Hopfield Network – Content Addressable Memory – Strange Attractors and Chaos -Error Performance of Hopfield Networks – Applications of Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional Associative Memory – BAM Stability Analysis – Error Correction in BAMs – Memory Annihilation of Structured Maps in BAMS

-Continuous BAMs – Adaptive BAMs – Applications

Adaptive Resonance Theory : Noise – Saturation Dilemma – Solving Noise – Saturation Dilemma – Recurrent On–center – Off– surround Networks – Building Blocks of Adaptive Resonance – Substrate of Resonance Structural Details of Resonance Model – Adaptive Resonance Theory – Applications

MODULE V: **[09 Periods]**
Self Organizing Maps : Self–organizing Map – Maximal Eigenvector Filtering – Sanger's Rule – Generalized Learning Law – Competitive Learning – Vector Quantization – Mexican Hat Networks – Self–organizing Feature Maps – Applications PULSED NEURON MODELS – Spiking Neuron Model – Integrate– and–Fire Neurons– Conductance Based Models – Computing with Spiking Neurons

TEXT BOOKS:
1.Satish Kumar, ‑Neural Networks, A Classroom Approach, Tata McGraw -Hill, 2004.
2.Simon Haykin, ‑Neural Networks, A Comprehensive Foundation‖, 2nd Edition, Addison Wesley Longman,2001.

REFERENCES:
1. Martin T.Hagan, Howard B. Demuth and Mark Beale, ‑Neural Network Design‖, Thomson Learning, 2003.
2. James A. Freeman and David M. Skapura, ‑Neural Networks Algorithms, Applications and Programming Techniques‖, Pearson Education, 2003.

Course Outcomes:
At the end of the course, students will be able to
1. Learn basic neural network architecture
2. Learn basic learning algorithms
3. Understand data pre and post processing
4. Learn training, verification and validation of neural network models
5. Design Engineering applications that can learn using neural networks

COS	Programme Outcomes(POs)												PSOs		
CO- PO,PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	3							3	3	3	
CO2	3	3	2	3	3								2	2	
CO3	3	3	3	2	2								2	2	
CO4	3	3	3	3	3								2	2	
CO5	3	3	3	3	2								2	2	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester	
Code: 80525	COMPUTER GRAPHICS [Professional Elective - I]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course is to enable the students to understand the fundamental concepts of display devices and output primitives, to demonstrate 2D transformations, viewing and clipping algorithms, explore different representations of 3D objects and illumination models, to understand 3D transformations and viewing, discuss surface detection and animation methods.

MODULE I: Introduction of Graphics [10 Periods]
Basics of Graphics - Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors, work stations and input devices.
Output Primitives - Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms, Filled area primitives- Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

MODULE II: Transforming and Viewing [10 Periods]
2-D geometrical transforms - Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.
2-D viewing - Viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

MODULE III: 3D Objects Representation [10 Periods]
A: Surfaces and Curve - Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves.
B: Models and Methods - Bezier and B- Spline surfaces, Basic illumination models, polygon rendering methods.

MODULE IV: 3D Geometric transformations and Viewing [09 Periods]
3-D Geometric transformations - Translation, rotation, scaling, reflection and Shear transformations, composite transformations.
 3-D Viewing - Viewing pipeline, viewing coordinates, view volumes and general projection transforms, clipping.

MODULE V: Surface detection Methods and Animation [09 Periods]
Visible surface detection methods - Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.
Computer Animation - Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems,

motion specifications.

TEXT BOOKS:
1. Donald Hearn and M.Pauline Baker, **"Computer Graphics C version"**, Pearson Education.
2. Foley,VanDam,Feiner and Hughes, **"Computer Graphics Principles & practice"**, 2nd edition in C, Pearson Education.

REFERENCES:
1. Donald Hearn and M.Pauline Baker, **"Computer Graphics"**, 2nd Edition, PHI/Pearson Education.
2. Zhigand xiang, Roy Plastock, Schaum's outlines, **"Computer Graphics",** 2nd edition, Tata Mc- Graw hill.
3. David F Rogers, **"Procedural elements for Computer Graphics"**, Tata Mc Graw hill, 2nd edition.

E-RESOURCES:
1. http://www.hiteshpatel.co.in/ebook/cg/Computer_Graphics_C_Version.pdf
2. http://ptgmedia.pearsoncmg.com/images/9780321399526/samplepages/0321399528.pdf
3. http://social.cs.uiuc.edu/papers/pdfs/g5kar.pdf
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7y_TqI7sLJ_1X3zVWNHhVwSwBCdfRRvSTrPP45TFWuzrxWT5ea_k_dP1rirZCeNbWw

Course Outcomes:
At the end of the course, students will be able to
1. **Develop** simple graphics applications.
2. **Apply** 2D objects transformations.
3. **Use** the Concepts of 3D Object representations.
4. **Design** 3D object transformations and viewing.
5. **Build** Animation sequences.

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3											3	
CO2	3												2		
CO3				2										2	
CO4					3									2	
CO5						2									3

CO- PO,PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80514	SOFTWARE ENGINEERING and UML LAB	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives: To understand the software engineering methodologies involved in the phases for project development. To gain knowledge about open source tools used for implementing software engineering methods. To exercise developing product-startups implementing software engineering methods. Open source Tools: StarUML / UMLGraph / Topcased.

Prepare the following documents and develop the software project startup, prototype model, using software engineering methodology for at least two real time scenarios or for the sample experiments.

- Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope, Objectives and Infrastructure.
- Software Requirement Analysis – Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements.
- Data Modeling – Use work products – data dictionary.
- Software Designing – Develop use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams.
- Prototype model – Develop the prototype of the product.

The SRS and prototype model should be submitted for end semester examination.

List of Sample Experiments:

Course management system (CMS)

A course management system (CMS) is a collection of software tools providing an

online environment for course interactions. A CMS typically includes a variety of

online tools and environments, such as:

- An area for faculty posting of class materials such as course syllabus and

    handouts

- An area for student posting of papers and other assignments
- A grade book where faculty can record grades and each student can view his or her grades
- An integrated email tool allowing participants to send announcement email messages to the entire class or to a subset of the entire class
- A chat tool allowing synchronous communication among class participants

- A threaded discussion board allowing asynchronous communication among participants

In addition, a CMS is typically integrated with other databases in the university so that students enrolled in a particular course are automatically registered in the CMS as participants in that course.

The Course Management System (CMS) is a web application for department personnel, Academic Senate, and Registrar staff to view, enter, and manage course information formerly submitted via paper. Departments can use CMS to create new course proposals, submit changes for existing courses, and track the progress of proposals as they move through the stages of online approval.

Easy Leave

This project is aimed at developing a web based Leave Management Tool, which is of importance to either an organization or a college.
The Easy Leave is an Intranet based application that can be accessed throughout the organization or a specified group/Dept. This system can be used to automate the workflow of leave applications and their approvals. The periodic crediting of leave is also automated. There are features like notifications, cancellation of leave, automatic approval of leave, report generators etc in this Tool.

Functional components of the project:
There are registered people in the system. Some are approvers. An approver can also be a requestor. In an organization, the hierarchy could be Engineers/Managers/Business Managers/Managing Director etc. In a college, it could be Lecturer/Professor/Head of the Department/Dean/Principal etc.

Following is a list of functionalities of the system: A person should be able to

- login to the system through the first page of the application
- change the password after logging into the system
- see his/her eligibility details (like how many days of leave he/she is eligible for etc)
- query the leave balance
- see his/her leave history since the time he/she joined the company/college
- apply for leave, specifying the from and to dates, reason for taking leave, address for communication while on leave and his/her superior's email id
- see his/her current leave applications and the leave applications that are submitted to him/her for approval or cancellation
- approve/reject the leave applications that are submitted to him/her
- withdraw his/her leave application (which has not been approved yet)

- Cancel his/her leave (which has been already approved). This will need to be approved by his/her Superior
- get help about the leave system on how to use the different features of the system
- As soon as a leave application /cancellation request /withdrawal /approval /rejection /password-change is made by the person, an automatic email should be sent to the person and his superior giving details about the action
- The number of days of leave (as per the assumed leave policy) should be automatically credited to everybody and a notification regarding the same be sent to them automatically
- An automatic leave-approval facility for leave applications which are older than 2 weeks should be there. Notification about the automatic leave approval should be sent to the person as well as his superior

E-Bidding

Auctions are among the latest economic institutions in place. They have been used since antiquity to sell a wide variety of goods, and their basic form has remained unchanged. In this dissertation, we explore the efficiency of common auctions when values are interdependent the value to a particular bidder may depend on information available only to others-and asymmetric. In this setting, it is well known that sealed-bid auctions do not achieve efficient allocations in general since they do not allow the information held by different bidders to be shared.

Typically, in an auction, say of the kind used to sell art, the auctioneer sets a relatively low initial price. This price is then increased until only one bidder is willing to buy the object, and the exact manner in which this is done varies. In my model a bidder who drops out at some price can "reenter" at a higher price. With the invention of E-commerce technologies over the Internet the opportunity to bid from the comfort of one's own home has seen a change like never seen before. Within the span of a few short years, what may have began as an experimental idea has grown to an immensely popular hobby, and in some cases, a means of livelihood, the Auction Patrol gathers tremendous response every day, all day. With the point and click of the mouse, one may bid on an item they may need or just want, and in moments they find that either they are the top bidder or someone else wants it more, and you're outbid! The excitement of an auction all from the comfort of home is a completely different experience.

Society cannot seem to escape the criminal element in the physical world, and so it is the same with Auction Patrols. This is one area where in a question can be raised as to How safe Auction Patrols.
Proposed system

- To generate the quick reports
- To make accuracy and efficient calculations

- To provide proper information briefly
- To provide data security
- To provide huge maintenance of records
  Flexibility of transactions can be completed in time

Electronic Cash counter

This project is mainly developed for the Account Division of a Banking sector to provide better interface of the entire banking transactions. This system is aimed to give a better out look to the user interfaces and to implement all the banking transactions like:

- Supply of Account Information
- New Account Creations
- Deposits
- Withdraws
- Cheque book issues
- Stop payments
- Transfer of accounts
- Report Generations.

Proposed System:

The development of the new system contains the following activities, which try to automate the entire process keeping in view of the database integration approach.
User friendliness is provided in the application with various controls.The system makes the overall project management much easier and flexible. Readily upload the latest updates, allows user to download the alerts by clicking the URL. There is no risk of data mismanagement at any level while the project development is under process. It provides high level of security with different level of authentication

Course Objectives: The student should take up the case studies of ATM system, Online Reservation System and Model it in different views i.e. Use case view, logical view, component view, Deployment view.

Week 1
Design a Use case Diagram for ATM system, Online Reservation System

Week 2
Design a Sequence Diagram for ATM system, Online Reservation System. Design a Collaboration Diagram for ATM system, Online Reservation System.

Week 3
Design a Activity Diagram for ATM system, Online Reservation System.
Design a State Chart Diagram for ATM system, Online Reservation System.

Week 4
Design a Class Diagram for ATM system, Online Reservation System.

Week 5
Design a Component Diagram for ATM system, Online Reservation System.

Week 6
Design a Deployment Diagram for ATM system, Online Reservation System.

Course Outcomes:
Upon completion of this course, students should be able to:
1. Analyze the requirements through Use-Case View
2. Identify all structural and behavioral concepts of the entire system
3. Develop a model using UML concepts by different types of diagrams like Usecase Diagram, Class Diagram, Sequence Diagram etc

<table>
<tr><td colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes(POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td></td></tr>
<tr><td>CO2</td><td></td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td></td></tr>
<tr><td>CO3</td><td>2</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td></tr>
</table>

Prerequisites: NIL

Course Objectives: This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing a database system using ER diagram, developing and querying a relational database using normalization techniques in the context of example database "Roadway travels". Students are expected to use "Mysql" database.

Roadway Travels: "Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

The company wants to computerize its operations in the following area

- Reservations and Ticketing
- Cancellations

Reservations & Cancellation: Reservations are directly handled by booking office. Reservations can be made 30 days in advance and tickets issued to passenger. One passenger/ person can book many tickets (to his/her family).Cancellations are also directly handed at the booking office.

In the process of Computerization of **Roadway Travels** you have to design and develop a Database which consists the data of Buses, Passengers, Tickets and Reservation and cancellation details. You should also develop query's using SQL to retrieve the data from the database.

The above process involves many steps like1. Analyzing the problem and identifying the Entities and Relationships, 2. E-R Model, 3. Relational Model, 4. Normalization
5. Creating the database, 6. Querying. Students are supposed to work on these steps week wise and finally create a complete —Database system to Roadway Travels. Examples are given at every experiment for guidance to students.

Experiment1: E-R Model
Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.
Example:
Entities: 1. BUS   2. Ticket   3. Passenger
Relationships: **1.** Reservation   2. Cancellation

**Primary Key Attributes: 1.** Ticket ID (Ticket Entity)

2. Passport ID (Passenger Entity) 3.Bus_NO (Bus Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Note: The student is required to submit a document by writing the Entities and Keys to the lab teacher.

Experiment2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.
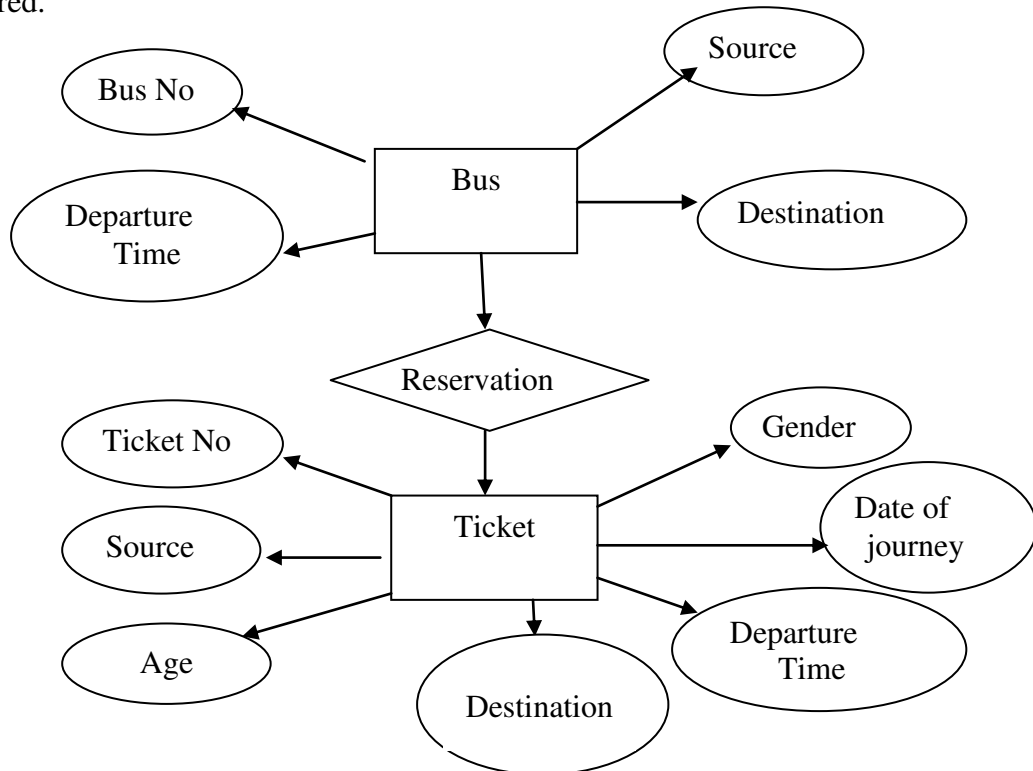
Note: The student is required to submit a document by drawing the E-R Diagram to the lab teacher.

Experiment3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multi-valued, and Derived) have different way of representation.

Example: E-R diagram for bus

Example: The passenger tables look as below. This is an example. You can add more attributes based on your E-R model. This is not a normalized table.

Passenger

Name	Age	Gender	Address	Ticket Id	Aadhaar Id

Note: The student is required to submit a document by Represent relationships in a tabular fashion to the lab teacher.

Experiment 4: Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

For the above table in the First normalization we can remove the multi valued attribute. Ticket_id and place it in another table along with the primary key of passenger.

First Normal Form: The above table can be divided into two tables as shown below.
Passenger

Name	Age	Gender	Address	Aadhaar ID

Aadhaar ID	Ticket ID

You can do the second and third normal forms if required. Anyhow Normalized tables are given at the end.

Experiment5: Installation of Mysql and practicing DDL commands

Installation of MySql. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases If not required. You will also try truncate, rename commands etc.

Example for creation of a normalized "Passenger" table.
CREATE TABLE Passenger (
Aadhaar_id INTEGER PRIMARY KEY,
NameVARCHAR (50) Not NULL,
Age Integer Not NULL,
Gender Char,
Address VARCHAR (50) Not NULL);

Similarly create all other tables.
Note: Detailed creation of tables is given at the end.

Experiment 6: Practicing DML commands

DML commands are used to for managing data within schema objects. Some examples:
SELECT - retrieve data from the a database
INSERT - insert data into a table

UPDATE - updates existing data within a table
DELETE - deletes all records from a table, the space for the records remain

Inserting values into Bus table:
Insert into Bus values (1234, 'hyderabad', _tirupathi');
Insert into Bus values (2345, 'hyderabd', 'Banglore');
Insert into Bus values (23, _hyderabad', _Kolkata');
Insert into Bus values (45, _Tirupathi', _Bangalore');
Insert into Bus values (34, _hyderabad', _Chennai');

Inserting values into Passenger table:
Insert into Passenger values (1, 45,'ramesh', 45,'M','123');
Insert into Passenger values (2, 78,'geetha', 36,'F','124');
Insert into Passenger values (45, 90, _ram', 30, _M', '12');
Insert into Passenger values (67, 89, _ravi', 50, _M', '14');
Insert into Passenger values (56, 22, _seetha', 32, _F','55');

Few more Examples of DML commands:
Select * from Bus; (selects all the attributes and display)
UPDATE BUS SET Bus No = 1 WHERE BUS NO=2;

Experiment7: Querying
In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.
Practice the following Queries:
1. Display unique PNR_no of all passengers.
2. Display all the names of male passengers.
3. Display the ticket numbers and names of all the passengers.
4. Display the source and destination having journey time more than 10 hours.
5. Find the ticket numbers of the passengers whose name start with 'A'and ends with 'H'.
6. Find the names of passengers whose age is between 30 and 45.
7. Display all the passengers names beginning with 'A'
8. Display the sorted list of passengers names

Experiment 8 and Experiment9: Querying (continued…)
You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

1. Write a Query to display the Information present in the Passenger and cancellation tables. **Hint:** Use UNION Operator.
2. Write a Query to display different travelling options available.
3. Display the number of days in a week on which the 9W01 bus is available.
4. Find number of tickets booked for each PNR_No using GROUP BY CLAUSE. **Hint:** Use GROUP BY on PNR_No.
5. Find the distinct PNR numbers that are present.
6. Find the number of tickets booked in each class where the number of seats is greater than 1. **Hint:** Use GROUP BY, WHERE and HAVING CLAUSES.
7. Find the total number of cancelled seats.

Experiment10: Triggers

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

Eg: CREATE TRIGGER update check BEFORE UPDATE ON passenger
FOR EACH ROW
BEGIN
IF NEW.TickentNO> 60 THEN
        SET New.Tickent no = Ticket no;
ELSE
        SET New.Ticketno = 0;
END IF;
END;

Experiment11: Procedures

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

Eg: **CREATE PROCEDURE myProc ()**
BEGIN
SELECT COUNT (Tickets) FROM Ticket WHERE age>=40;
End;

Experiment12: Cursors

In this week you need to do the following: Declare a cursor that defines a result set. Open the cursor to establish the result set. Fetch the data into local variables as needed from the cursor, one row at a time. Close the cursor when done

CREATE PROCEDURE myProc (in_customer_id INT)
BEGIN
DECLARE v_id INT;
DECLARE v_name VARCHAR (30);
DECLARE c1 CURSOR FOR SELECT stdId, stdFirstname FROM students
WHERE stdId=in_customer_id;
OPEN c1;
FETCH c1 into v_id, v_name;
Close c1;
END;

Tables

BUS

Bus No   : Varchar: PK (Public key)
Source   : Varchar
Destination   : Varchar

Passenger

AadharNO   : Varchar(15) : PK
Name   : Varchar(15)
Age   : int (4)
Gender   :Char(10)   : Male / Female
Address   : VarChar(20)

Passenger_Tickets

AadharNO   : Varchar(15):
PK Ticker_No: Numeric(9)

Reservation
Bus No   : Varchar: FK
Ticket _No   : Numeric(9) : FK
Journey_date   : datetime(8)
No_of_seats   : int (8)
Address   : Varchar (50)
Contact_No: Numeric (10) -->should not be less than 10 and should not accept any
                           other character other than Integer
Status: Char (2)   : Yes / No

Cancellation
Ticket _No   : Numeric(9) : FK
Journey_date   : datetime(8)
No_of_seats   : int (8)
Address   : Varchar (50)
Contact_No   : Numeric (9) -->should not be less than 9 and should not accept any
                           other character other than Integer
Status   : Char (2)   : Yes / No

Ticket
Ticket_No   : Numeric (9): PK
BusNo   : Varchar : FK
Journey_date   : datetime(8)
Age   : int (4)
Gender   :Char(10)   : Male / Female
Source   : Varchar
Destination   : Varchar
Dep_time   : Varchar

TEXT BOOKS:
1. Rick F.Vander Lans, "**Introduction to SQL**", Pearson education.
2. B.Rosenzweig and E.Silvestrova,"**Oracle PL/SQL**", Pearson education.

REFERENCES:
1. Dr.P.S.Deshpande, "**SQL & PL/SQL for Oracle 10g**", Black Book, Dream Tech.
2. M.Mc Laughlin,"**Oracle Database 11g PL/SQL Programming**", TMH.

Course Outcomes:
At the end of the course, students will be able to
1. **Design** and implement a database schema for a given problem.
2. **Generate** queries using SQL DML/DDL/DCL commands on a database.
3. **Declare** normalization techniques for development of application software to realistic problems.
4. **Make** use of procedures for various Data Base accessing and manipulations.

CO- PO,PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3			2				3		2	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	3	3			3				3		3	3	3	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80603	**WEB TECHNOLOGIES LAB**	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL
Course Objectives:

To enable the student to program web applications using the following technologies, AJAX, PHP, Tomcat Server, Servlets, JSP

Software Requirements: JDK, BDK and Tomcat Server
Note:

1. Use LAMP Stack (Linux, Apache, MySQL and PHP) for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform wherever applicable.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Programs:

1. Install the following on the local machine
   - Apache Web Server (if not installed)
   - Tomcat Application Server locally
   - Install MySQL (if not installed)
   - Install PHP and configure it to work with Apache web server and MySQL (if not already configured)

2. Write an HTML page including javascript that takes a given set of integer numbers and shows them after sorting in descending order.

3. Write an HTML page including any required Javascript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.

4. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert

message. Words are separated with white space and lines are separated with new line character.

5. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

6. Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using (a) DOM Parser and (b) SAX parser.

Implement the following web applications using (a) PHP, (b) Servlets and (c) JSP:

7. A user validation web application, where the user submits the login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.

8. Modify the above program to use an xml file instead of database.

9. Modify the above program to use AJAX to show the result on the same page below the submit button.

10. A simple calculator web application that takes two numbers and an operator (+, -, /, * and%) from an HTML page and returns the result page with the operation performed on the operands.

11. Modify the above program such that it stores each query in a database and checks the database first for the result. If the query is already available in the DB, it returns the value that was previously computed (from DB) or it computes the result and returns it after storing the new query and result in DB.

12. A web application takes a name as input and on submit it shows a hello <name> pagewhere <name> is taken from the request. It shows the start time at the right top corner ofthe page and provides a logout button. On clicking this button, it should show a logoutpage with Thank You <name> message with the duration of usage (hint: Use session tostore name and time).

13. A web application that takes name and age from an HTML page. If the age is less than18, it should send a page with "Hello <name>, you are not authorized to visit this site"message, where <name> should be replaced with the entered name. Otherwise it shouldsend "Welcome <name> to this site" message.

14. A web application for implementation:

The user is first served a login page which takes user's name and password. Aftersubmitting the details the server checks these values against the data from a database andtakes the following decisions.

If name and password matches, serves a welcome page with user's full name. If name matches and password doesn't match, then serves "password mismatch" page

If name is not found in the database, serves a registration page, where user's full name isasked and on submitting the full name, it stores, the login name, password and full namein the database (hint: use session for storing the submitted login name and password)

15. A web application that lists all cookies stored in the browser on clicking "List Cookies"button. Add cookies if necessary.

TEXT BOOKS:

1. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill
2. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech

REFERENCES:
1. Java Server Pages –Hans Bergsten, SPD O'Reilly
2. Java Script, D.Flanagan, O'Reilly, SPD.
3. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

Course Outcomes:
At the end of the course, students will be able to
1. **Demonstrate** use of LAMP Stack for web applications and Tomcat Server for Servlets and JSPs
2. **Design** simple applications with Technologies like HTML, Javascript, AJAX, PHP,
3. **Utilize** the concepts of Servlets and JSPsand implement dynamic websites and Connect to Database and get results
4. **Use**Parse XML files using Java (DOM and SAX parsers)

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		3	2		2		2		3	2	3	3
CO2			3		3	2		2		2		3	2	3	3
CO3			3		3	2		2		2		3	2	3	3
CO4			3		3	2		2		2		3	2	3	3

CO- PO,PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Prerequisites: NIL

Course Objectives:

An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo-systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment.

MODULE I: Ecosystems: [05 Periods]

Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains, food webs and ecological pyramids, Flow of energy.

MODULE II: Natural resources, Biodiversity and Biotic resources   [09 Periods]

Natural Resources - Classification of Resources: Living and Non-Living resources, Renewable and non- renewable E-RESOURCES. Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources–case studies. Energy resources: growing energy needs, introduction to renewable and nonrenewable energy sources.

Biodiversity and Biotic resources - Introduction, Definition, genetic, species and ecosystem diversity. Values of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Threats to Biodiversity (habitat loss, poaching of wildlife, man-wildlife conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation)

MODULE III: Environmental pollution and control   [06 Periods]

A: Classification of pollution and pollutants, Causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards.

B: Soil Pollution: Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of hazardous waste, oastal Pollution due to sewage and marine disposal of industrial effluents. E-waste and its management.

MODULE IV: Global Environmental Problems and Global effects: [06 Periods]

Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances ODS). Deforestation and desertification. International conventions/Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

MODULE V: Towards sustainable future: **[06 Periods]**
Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism (CDM).

TEXT BOOKS:
1. R. Rajagopalan, **"Environmental studies From crisis to cure"**, Oxford University Press 2 nd Edition, 2005.
2. Anubha Kaushik, C. P. Kaushik, "**Environmental studies**" New age International Publishers,4 th Edition,2012.

REFERENCES:
1. Erach Bharucha, "**Environmental studies**" University Grants Commission, and University Press, 1st Edition, 2005.
2. M. Anji Reddy "**Text book of Environmental Science and Technology**" 3 rd Edition, 2007
3. Richard T. Wright, "**Environmental Science: towards a sustainable future** "PHL Learning,Private Ltd. New Delhi, 2 nd Edition., 2008
4. Gilbert McMasters and Wendell P. Ela, "**Environmental Engineering and science**", 3rd Edition, PHI Learning Pvt. Ltd., 2008.

E-RESOURCES
1. http://www.gdrc.org/uem/ait-terms.html (Glossary of Environmental terms).
2. http://www.environmentalscience.org/ (Environmental sciences Lectures series).
3. Journal of earth science and climatic change (OMICS International Journal).
4. Journal of pollution effects & control (OMICS International Journal).
5. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
6. http://www.nptelvideos.in/2012/12/fundamentals-of- environmental-pollution.html

Course Outcomes:
At the end of the course, students will be able to
1. **To enable** the students to realize the importance of ecosystem, its structure, services. To make the students aware of Different natural functions of ecosystem, this helps to sustain the life on the earth.
2. **To use** natural resources more efficiently.
3. **To make** the students aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. **To educate** the students regarding environmental issues and problems at local, national and international level.
5. **To know** more sustainable way of living

COS	Programme Outcomes(POs)											
CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		1		1	2	1					
CO2	2	3	2	3	1	3		2				
CO3	3	3	2	3	2	2		1				
CO4	3	2	2	1	2	1						
CO5	2	1	1			1	3	3				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80H05	**MANAGEMENT FUNDAMENTALS**	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:
Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization.

MODULE – I: Management and Principles of Management   [09 Periods]
Introduction to Management: Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.
Management Theories: Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE – II: Planning, Organization and types of Structures   [10 Periods]
Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).
Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE – III: Staffing and controlling   [10 Periods]
A. **Staffing:** Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.
B. **Controlling:** process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE – IV: Operations and Materials Management   [09 Periods]
Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.
Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE – V: Project Management and Contemporary Practices [10 Periods]
Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)
Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels, Bench marking, Balanced Score card.

TEXT BOOKS:
1. Aryasri, **Management Science**, 4th edition TMH, 2004. (UNITS I,II,III,IV,V)
2. Stoner, Freeman, Gilbert, **Management,** Pearson Education, New Delhi, 6th Ed, 2004. (UNITS I,II)

REFERENCES*:*
1. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
2. Koontz & Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
3. Thomas N.Duening & John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
4. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
5. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

E RESOURCES:
1. http://freevideolectures.com/Course/2689/Management-Science
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=human-resource-management
3. http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental
4. http://freevideolectures.com/Course/2371/Project-and-Production-Management
5. http://nptel.ac.in/courses/110105034/

Course Outcomes:
    At the end of the course, students will be able to
1. Understand the various concepts, principles and theories of management.
2. Understand the basic concepts of planning and various structures of organizations.
3. Understand the process of staffing and controlling
4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.
5. Understand the various contemporary management practices. Also the project management techniques.

COS	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									2	3	1	
CO2		3							2		1	
CO3		3								2	1	
CO4		3		2	1							
CO5				2			3				1	

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80516	COMPILER DESIGN	L	T	P
Credits: 3		3	-	-

Prerequisites: Formal Languages and Automata Theory.
Course Objectives:
This course outlines the major concept areas of language translation and various phases of compiler, extend the knowledge of parser by parsing LL parser and LR parser, analyze the intermediate forms and the role of symbol table, classify code optimization techniques and analyze the data flow and develop machine code generation algorithms.

MODULE I: Overview of Compilation [08 Periods]
Introduction to Lexical Analyzer - Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation.
Bootstrapping and LEX - Bootstrapping, data structures in compilation – LEX lexical analyzer generator.

MODULE II: Parsing [11 Periods]
Top down parsing - Context free grammars, Backtracking, LL (1), recursive descent parsing, Predictive parsing, preprocessing steps required for predictive parsing.
Bottom up parsing - Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing handling ambiguous grammar, YACC – automatic parser generator.

MODULE III: Intermediate Code Generation and Symbol Table [12 Periods]
A: Intermediate Code Generation - Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes, attributed grammars, Syntax directed translation, Conversion of popular Programming languages, language Constructs into Intermediate code forms, Type checker.
B: Symbol Table - Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information, Block structures and non block structures. storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

MODULE IV: Code Optimization and Data Flow Analysis [09 Periods]
Code optimization - Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.
Data flow analysis - Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

MODULE V: Object Code Generation and Memory Allocation [08 Periods]
Object code generation - Object code forms, machine dependent code optimization.
Memory Allocation - Register allocation and assignment, generic code generation algorithms, DAG for register allocation

TEXT BOOKS:
1. A.V. Aho, J.D.Ullman,"**Principles of compiler design**" ,Pearson Education.
2. Andrew N. Appel,"**Modern Compiler Implementation in C**", Cambridge University Press.

REFERENCES:
1. John R. Levine, Tony Mason, Doug Brown," **Lex&yacc**", O'reilly
2. Dick Grune, Henry E. Bal, Cariel T. H. Jacobs," **Modern Compiler Design**", Wiley Dream tech.
3. Cooper & Linda," **Engineering a Compiler**", Elsevier.
4. Louden," **Compiler Construction**", Thomson.

E-RESOURCES:
1. https://www.scribd.com/doc/127012720/Principles-of-Compiler-Design-A-v-Aho-J-D-ullman-Pearson-Education
2. https://github.com/yihui-he/Modern-Compiler-Implementation-in-C/blob/master/Modern%20Compiler%20Implementation%20in%20C.pdf
3. http://ieeexplore.ieee.org/document/1018133/
4. http://ieeexplore.ieee.org/document/6449312/
5. http://nptel.ac.in/courses/106108113/

Course Outcomes:
At the end of the course, students will be able to
1. **Distinguish** the various phases of compilation.
2. **Explain** the different types of parsing techniques.
3. **List** the intermediate forms of source programs and organize symbol table.
4. **Make use of** code optimization techniques to reduce the code.
5. **Build** the Object code generation algorithms.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3										2	2		
CO2	3	2										2	2		
CO3	2	3										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2	2		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80517	**COMPUTER NETWORKS**	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Transport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.

MODULE I: Basics of Networking and Physical layer   [10 Periods]

Basics of Networking - Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, TCP/IP model.

Physical layer - Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

MODULE II: Data link layer   [11 Periods]

Functionalities of Data link layer - Introduction, Framing, Error Detection and Correction – Parity – LRC – CRC- Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. Random access, Controlled access, Channelization, Collision Free Protocols.

LAN - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11

MODULE III: Network Layer   [09 Periods]

A: Basics of Network Layer - Logical Addressing, Internetworking, Tunneling, Address mapping,

B: Communication Protocols - ICMP, IGMP, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols.

MODULE IV: Transport Layer   [09 Periods]

Connection Oriented and Connectionless Protocols -Process to Process Delivery, UDP and TCP protocols, SCTP.

Congestion Control - Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

MODULE V: Application layer   [09 Periods]

DNS - Domain name space, DNS in internet, Electronic mail

Protocols and Network Security - FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4[th]Edition, TMH, 2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, Pearson Education/PHI.

REFERENCES:
1. P.C .Gupta, **"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**, 2nd Edition, Pearson   Education.
3. W.A. Shay, **"Understanding communications and Networks"**, 3rd Edition, Cengage   Learning.
4. James F.Kurose & Keith W. Ross, **"Computer Networking: A Top-Down Approach Featuring the Internet"**, 3rd Edition, Pearson Education.

E-RESOURCES:
1. https://www.saylor.org/site/wp-content/uploads/2012/02/Computer-Networking-Principles- Bonaventure-1-30-31-OTC1.pdf
2. http://ebook-dl.com/downloadbook/230
3. https://doi.org/10.1016/0169-7552(89)90019-6
4. http://nptel.ac.in/courses/106105081/

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** the Layered Architecture of Computer Networks.
2. **Conceptualize** the protocols of Data Link Layer and can build Local area networks.
3. **Apply** Subnet and Supernet concepts in the construction of computer network**.**
4. **Summarize** the protocols used in Transport Layer, QoS and Congestion control mechanisms.
5. **Analyze** different protocols of Application Layer and various security risks.

CO- PO, PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1			3											2	
CO2			2												2
CO3						3							3		
CO4					2										
CO5		3												2	

Professional Elective – II

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80526	ADVANCED DATABASES [Professional Elective - II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Database Concepts.
Course Objectives: To understand the distributed database management and real-time application management.

Module I: Introduction of DBMS: [10 Periods]
Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.
Overview of Relational DBMS
Relational Database Concepts, Normalization, Integrity rules, Relational data languages.

Module II: Distributed DBMS Architecture: [09 Periods]
Architectural Models for Distributed DBMS, DDBMS Architecture. Distributed Database Design: Alternative Design Strategies, Distributed Database, Design issues, Fragmentation, Allocation.

Module III: Query Processing and Decomposition   [09 Periods]
A: Query Processing objectives, Characterization of query processors.
B: Layers of query processing, query decomposition, Localization of distributed data.

Module IV: Query Optimization: [09 Periods]
Query optimization, centralized query optimization, Distributed query optimization algorithms.

Module V: Transaction Management and Concurrency Control   [11 Periods]
Transaction Management: Definition, properties of transaction, types oftransactions.
Distributed Concurrency Control: Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.

TEXT BOOKS:
1. M.Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Willipse Pelagatti: Distributed Databases, McGraw Hill.

REFERENCES:
1. Henry F Korth, A Silberchatz and Sudershan: Database System Concepts, MGH.
2. Raghuramakrishnan and Johhanes Gehrke: Database Management Systems, MGH.

Course Outcomes:

At the end of the course, students will be able to:

1. Understand the role of a distributed database management system in an Enterprise/organization.
2. Design queries of a distributed database management system
3. Apply the principles of query optimization techniques to a database schema.
4. Understand the concept of a database transaction including concurrency control, backup and recovery, and data object locking and protocols.
5. Explain the various types of locking mechanisms used in within database management systems.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
Programme Outcomes(POs)													**PSOs**		
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80617	**ARTIFICIAL INTELLIGENCE** [Professional Elective - II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Discrete Mathematics
Course Objectives:
This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques

MODULE I: Introduction [10 Periods]
Introduction to Artificial Intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI.

MODULE II: Problem Solving [09 Periods]
Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction.
Problem reduction and game playing: Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games.

MODULE III: Logic Concepts and Knowledge Representation [10 Periods]
A: Logic Concepts - Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.
B: Knowledge Representation - Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

MODULE IV: Expert System and Applications [10 Periods]
Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

MODULE V: Uncertainty Measure [09 Periods]
Probability theory: Introduction, Bayesian belief networks, certainty factor theory, dempster-shafer theory.
 Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:
1. Saroj Kaushik, "**Artificial Intelligence**", CENGAGE Learning,
2. Stuart Russel, Peter Norvig, "**Artificial intelligence, A modern Approach**", 2nd ed, PEA
3. Rich, Kevin Knight, Shiv Shankar B Nair, "**Artificial Intelligence**", 3rd Ed, TMH
4. Patterson,"**Introduction to Artificial Intelligence**", PHI

REFERENCES:
1. George F Lugar, **"Atificial intelligence, structures and Strategies for Complex problem solving"**, 5th edition, PEA
2. Ertel, Wolf Gang, "**Introduction to Artificial Intelligence**", Springer
3. Blay WhitBY "**Artificial Intelligence**" Rosen Publishing.

E-RESOURCES:
1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-and-knight.pdf
2. https://books.google.co.in/books?id=pVR9W5LEZUwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. https://www.journals.elsevier.com/artificial-intelligence/
4. http://www.ceser.in/ceserp/index.php/ijai
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zRG3BvdUVy2TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12-lgOzTVbb5oZ6eQOBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

Course Outcomes:
At the end of the course, students will be able to
1. **Describe** the key components of the Artificial Intelligence field.
2. **Identify** various problem solving strategies.
3. **Construct** the solution for the problem using various logic and knowledge representation techniques.
4. **Interpret** the knowledge in various domains using expert systems.
5. **Discover** the solutions by using the probability theory and fuzzy logic.

COS																

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80527	ANIMATION TECHNIQUES [Professional Elective – II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Graphics
Course Objectives:
This course will enable the students to learn the fundamental concepts of animation, creating flash animation concepts, learn the 3d animation techniques, apply the motion capture software for animation and analyze various color models.

MODULE I: Introduction   [09 Periods]
What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

MODULE II: Creating Animation in Flash   [10 Periods]
Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based   Animation   -   Working   with   the Time line and Twin based animation - Understanding Layers – Action script.

MODULE III: 3D Animation Effects   [10 Periods]
A: 3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic3D Animation.
B: Texturing & Lighting of 3D Animation – 3D Camera Tracking –Applications & Software of 3D Animation.

MODULE IV: Motion Capture   [09 Periods]
Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Softwares' – Script Animation Usage – Different Languages of Script Animation among the Software.

MODULE V: Color Model   [10 Periods]
Concept Development –Story Developing –Audio & Video – Color Model –Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TEXT BOOKS:
1. Juke Parent, **"Computer Animation: Algorithms and Techniques"**, 3rd Edition, (Hardcover,RickParent).
2. Williams Richars, "**The Animator's Survival Kit--Revised Edition: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Internet"**, Faber & Faber, 2012.

REFERENCES:
1. Alex Michael, **"Animating with Flash MX Professional Creative Animation**

Techniques", 1st edition Focal Press, 2003.

E-RESOURCES:
1. http://www.bkstr.com/floridastore/home Autodesk Maya 2016
2. https://itunes.apple.com/us/app/the-animators-survival-kit/id627438690?mt=8
3. http://ieeexplore.ieee.org/document/7239940/
4. nptel.ac.in/courses/106102063/25

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** fundamental concepts of animation.
2. **Implement** animation using flash concepts.
3. **Outline** the scripting concepts in 3D animation methods.
4. **Analyze** the different languages of scripting animation techniques.
5. **Apply** the story developing and color model in 3D animated movies.

<table>
<tr><td colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COS</td><td colspan="12">Programme Outcomes(POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>1</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td>1</td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>2</td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td>2</td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>3</td><td>3</td></tr>
</table>

Professional Elective – III

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80528	DISTRIBUTED SYSTEMS [Professional Elective – III]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks, DBMS and Operating Systems
Course Objectives:
Student will be able to learn fundamental aspects of Distributed systems and analyze basics of Architectural and Fundamental Models. To identify various types of requirements and the process for Distributed objects. To make use of various OS layers to conceptualize and construct a system, to demonstrate different file systems tactics and define Events and time ordering in distributed transactions.

MODULE I: Basic Concepts [09 Periods]
Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies.

MODULE II: Processes and Distributed Objects [09 Periods]
Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study.

MODULE III: Operating System Issues I [10 Periods]
The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System.

MODULE IV: Operating System Issues II [10 Periods]
Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

MODULE V: Distributed Transaction Processing [10 Periods]
Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems.

TEXT BOOKS:
1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and Pardigms", Pearson Education, 2002.

REFERENCES:
1. Sape Mullender, "Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", springer, Verlag, 1994.
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.

E- REFERENCES:
1. http://www.gecg.in/papers/ds5thedn.pdf
2. https://cs.uwaterloo.ca/~bernard/courses/cs454/0.Begin.pdf
3. https://www.cs.helsinki.fi/u/jakangas/Teaching/DistSys/DistSys-08f-1.pdf
4. https://courses.cs.ut.ee/MTAT.08.009/2014_fall/uploads/Main/slides10-2.pdf

Course Outcomes:
At the end of the course, students will be able to:
1. Structuring distributed applications: using client-server and remote procedure calls.
2. Learns inter process communication and distributed objects.
3. Design Cryptographic Algorithms and security issues for distributed systems.
4. Assess distributed file systems.
5. Ordering of events: using logical and physical clocks.

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3		3								3	1	
CO2	1	3		2									2	1	
CO3			3	2	3				3				2	3	
CO4	2	3											2		
CO5	2	2			2								3		

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80529	IMAGE PROCESSING	L	T	P
Credits: 3	[Professional Elective – III]	3	-	-

Prerequisites: NIL

Course Objectives:

To comprehend the relation between human visual system and machine perception and processing of digital images. To provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.

MODULE I: Digital Image Fundamentals & Image Transforms   [09 Periods]

Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

MODULE II: Image Enhancement (Spatial Domain)   [11 Periods]

Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

MODULE III: Image Restoration   [09 Periods]

A: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters.

B: Constrained Least Squares Restoration, Interactive Restoration.

MODULE IV: Image Segmentation   [10 Periods]

Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion, Structuring Element Decomposition, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

MODULE V: Image Compression   [09 Periods]

Redundancies and Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, "**Digital Image Processing**", 3rd Edition, Pearson, 2008
2. S Jayaraman, S Esakkirajan, T Veerakumar, "**Digital Image Processing**", Mc Graw Hill Education, 2010.

REFERENCES:

1. Scotte Umbaugh, "**Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools**", 2nd Ed, CRC Press, 2011
2. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, "**Digital Image Processing using MATLAB**", 2nd Edition, MC GRAW HILL EDUCATION, 2010.
3. Somka, Hlavac, "**Digital Image Processing and Computer Vision**", Boyle-engage Learning (Indian edition) 2008.
4. Adrian low, "**Introductory Computer Vision Imaging Techniques and Solutions**", 2008, 2nd Edition

E-RESOURCES:

1. https://trove.nla.gov.au/work/5520972
2. http://web.ipac.caltech.edu/staff/fmasci/home/astro_refs/Digital_Image_Processing_2ndEd.pdf
3. https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=83

Course Outcomes:

At the end of the course, students will be able to
1. Exploration of the limitations of the computational methods on digital images.
2. Expected to implement the spatial and frequency domain image transforms on enhancement
3. Explain the different image restoration of images.
4. Elaborate understanding on image enhancement techniques.
5. Analyze and define the need for compression and evaluate the basic compression algorithms

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2									3		
CO2	3	2	2	3	3		3			2			2		
CO3	2		3	3	2										
CO4	3	3	3	3			3			2			3		3
CO5	2		2	2	3								2		2

Prerequisites: Web Technologies

Course Objectives:

This course enables the students to learn and understand the fundamental technologies for enabling the envisioned semantic web, study various knowledge representation techniques, make use of development tools and methods for ontology engineering, construct application and services using semantic web technologies and analyze various collaboration networks.

MODULE I: World Wide Web [09 Periods]

Web Intelligence - Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence

Web Description - Ontology, Inference Engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

MODULE II: Knowledge Representation for the Semantic Web [10 Periods]

Ontology - Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web -Resource Description Framework (RDF) / RDF Schema,

Web Languages - Ontology Web Language (OWL), UML, XML, XML Schema.

MODULE III: Ontology Engineering [10 Periods]

A: Ontology Development - Ontology Engineering, constructing Ontology, Ontology Development Tools, Ontology Methods

B: Ontology Sharing and Merging - Ontology Sharing and Merging, Ontology Libraries and Ontology mapping, Logic, Rule and Inference Engines.

MODULE IV: Semantic Web Applications, Services and Technology[10 Periods]

Semantic Web Services - Semantic Web applications and services, Semantic Search, e-learning

Semantic Web Applications - Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods

MODULE V: Social Network Analysis and Semantic Web [09 Periods]

Social Network Analysis - What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis - Electronic Discussion networks.

Semantic Web - Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Berners Lee, Gödel and Turing, "**Thinking on the web**", Wiley interscience, 2008.

2. Peter Mika, ". **Social Networks and the Semantic Web**", Springer, 2007.

REFERENCES:
1. J.Davies, R.Studer, P.Warren, Johri. Wiley & Sons, "**Semantic Web Technologies, Trends and Research in Ontology Based Systems**"
2. Liyang Lu Chapman and Hall, **" Semantic Web and Semantic Web Services**", CRC Publishers,(Taylor & Francis Group)

E-RESOURCES:
1. http://as.wiley.com/WileyCDA/WileyTitle/productCd-0471768669.html
2. http://www.springer.com/in/book/9780387710006
3. https://research.vu.nl/ws/portalfiles/portal/2312133
4. http://nptel.ac.in/courses/106105077/18

Course Outcomes:
At the end of the course, students will be able to
1. **Develop** web applications using semantic techniques.
2. **Relate** knowledge representation methods for semantic web.
3. **Explain** the key aspects of ontology engineering**.**
4. **Design** web services and its applications.
5. **Analyze** and build a social network.

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2		2				3					2	
CO2	2	3		1									2		
CO3			2	3	3								2	1	
CO4			2	2	2				3					2	
CO5	2	3			1								2		

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Prerequisites: NIL
Course Objectives:
This course outlines the major concept areas of language translation and various phases of compiler, extend the knowledge of parser by parsing LL parser and LR parser, analyze the intermediate forms and the role of symbol table, classify code optimization techniques and analyze the data flow and develop machine code generation algorithms.

Software Requirements: C++ Compiler / JDK kit, (LEX, YACC) / UBUNTU

List of Programs:
Consider the following mini Language, a simple procedural high-level language, only operating on integer data, with a syntax looking vaguely like a simple C crossed with Pascal.

The syntax of the language is defined by the following BNF grammar:
<program> ::= <block>
<block> ::= { <variabledefinition> <slist> } | { <slist> }
<variabledefinition> ::= int<vardeflist>;
<vardeflist> ::= <vardec> | <vardec>, <vardeflist>
<vardec> ::= <identifier> | <identifier> [<constant>]
<slist> ::= <statement> | <statement>; <slist>
<statement> ::= <assignment> | <ifstatement> | <whilestatement> | <block> |
    <printstatement> | <empty>
<assignment> ::= <identifier> = <expression> | <identifier> [<expression>] =
    <expression>
<ifstatement> ::= <bexpression> then <slist> else <slist> endif | if <bexpression> then
    <slist> endif
<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print (<expression>)
<expression> ::= <expression> <additionop> <term> | <term> | addingop> <term>
<bexpression> ::= <expression> <relop> <expression>
<relop> ::= < | <= | == | >= | > | !=
<addingop> ::= + | -
<term> ::= <term> <mulitop> <factor> | <factor>
<multop> ::= * | /
<factor> ::= <constant> | <identifier> | <identifier> [<expression>] | (<expression>
)
<constant> ::= <digit> | <digit> <constant>
<identifier> ::= <identifier> <letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9

<empty> has the obvious meaning

Comments (zero or more characters enclosed between the standard C / Java style comment brackets /*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration

int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2] Note also that you should worry about the scoping of names.

A simple program written in this language is:

```
{
    int a[3], t1, t2;
    t1 = 2;
    a[0] = 1; a[1] = 2; a[t1] = 3;
    t2 = -(a[2] + t1 * 6)/ a[2] - t1);
    if t2 > 5 then
    print(t2);
    else
    {
      int t3;
      t3 = 99;
      t2 = -25;
      print(-t1 + t2 * t3); /* this is a comment on 2 lines */
    }
    endif
}
```

1. Design a Lexical analyzer for the above language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools.
3. Write a C program to recognize strings under 'a*', 'a*b+', 'abb'
4. Write a C program to test whether a given identifier is valid or not
5. Write a Program for Implementation of recursive descent Parser.
6. Design Predictive parser for the given language.
7. Write a program to calculate first function for the given grammar.
8. Write a Program for Implementation of Shift Reduce parsing
9. Write a program to Design predictive parser or LL(1) parser for the given grammar.
10. Design LALR bottom up parser for the above language.
11. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
12. Write program to generate machine code from the abstract syntax tree generated by the parser.

The following instruction set may be considered as target code.

The following is a simple register-based machine, supporting a total of 17 instructions. It has three distinct internal storage areas. The first is the set of 8 registers, used by the individual instructions as detailed below, the second is an area used for the storage of variables and the third is an area used for the storage of program. The instructions can be preceded by a label. This consists of an integer in

the range 1 to 9999 and the label is followed by a colon to seperate it from the rest of the instruction. The numerical label can be used as the argument to a jump instruction, as detailed below.

In the description of the individual instructions below, instruction argument types are specified as follows:

R specifies a register in the form R0, R1, R2, R3, R4, R5, R6 or R7 (or r0, r1, etc).

L specifies a numerical label (in the garbage 1 tp 9999).

V specifies a "variable location" (a variable number, or a variable location pointed to by a register - see below).

A specifies a constant value, a variable location, a register or a variable location pointed to by a register (an indirect address). Constant values are specified as an integer value, optionally preceded by a minus sign, preceded by a # symbol. An indirect address is specified by an @ followed by a register.

So, for example an A-type argument could have the form 4 (variable number 4), #4 (the constant value 4), r4 (register 4) or @r4 (the contents of register 4 identifies the variable location to be accessed).

The instruction set is defined as follows:

    LOAD A, R
    loads the integer value specified by A into register R.
    STORE R, V
    stores the value in register R to variable V.
    OUT R
    outputs the value in register R.
    NEG R
    negates the value in register R.
    ADD A, R
    adds the value specified by A to register R, leaving the result in register R.
    SUB A, R
    subtracts the value specified by A from register R, leaving the result in register R.
    MUL A, R
    multiplies the value specified by A by register R, leaving the result in register R.
    DIV A, R
    divides register R by the value specified by A, leaving the result in register R.
    JMP L
    causes an unconditional jump to the instruction with the label L.
    JEQ R, L
    jumps to the instruction with the label L if the value in register R is zero.
    JNE R, L
    jumps to the instruction with the label L if the value in register R is not zero.
    JGE R, L
    jumps to the instruction with the label L if the value in register R is greater than or equal to zero.
    JGT R, L
    jumps to the instruction with the label L if the value in register R is greater than zero.
    JLE R, L
    jumps to the instruction with the label L if the value in register R is less than or equal to zero.
    JLT R, L
    jumps to the instruction with the label L if the value in register R is less than zero.

NOP

is an instruction with no effect. It can be tagged by a label.

STOP

stops execution of the machine. All programs should terminate by executing a STOP instruction.

TEXT BOOKS:
1. A.V. Aho .J.D.Ullman ,"**Principles of compiler design**" ,Pearson Education.
2. Andrew N. Appel, "**Modern Compiler Implementation in C**", Cambridge University Press.
3. D.M Dhamdhere, "**Systems programming and operating systems**" ,2nd edition,tata McGraw hill publishing comp pvtLtd.

REFERENCES:
1. John R. Levine, Tony Mason, Doug Brown," **Lex&yacc**", O'reilly
2. Dick Grune, Henry E. Bal, Cariel T. H. Jacobs," **Modern Compiler Design**", Wiley dreamtech.
3. Cooper & Linda," **Engineering a Compiler**", Elsevier.
4. Louden," **Compiler Construction**", Thomson.

Course Outcomes:

At the end of the course, students will be able to

1. **Apply** the knowledge of lex tool & yacc tool to develop a scanner & parser.
2. **Develop** program for solving parser problems.
3. **Create** program for intermediate code generation.
4. **Write** code to generate abstract syntax tree and to convert BNF to YACC.
5. **Implement** target code from the abstract syntax tree.

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(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td><td></td></tr>
<tr><td>CO2</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td><td></td></tr>
<tr><td>CO3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td><td></td></tr>
<tr><td>CO4</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td>2</td><td></td><td>2</td><td></td></tr>
<tr><td>CO5</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td><td></td></tr>
</table>

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80519	**COMPUTER NETWORKS LAB**	**L**	**T**	**P**
Credits: 2		-	1	2

Prerequisites: NIL
Course Objectives:
This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Tranport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.

Software Requirements: Turbo C/JDK

List of Programs:
1. Implement the data link layer farming methods:
   a) CharacterCount
   b) Character stuffing and destuffing.
   c) Bit stuffing and destuffing
2. Implement on a data set of characters the three CRC polynomials: CRC-12, CRC-16 and CRC-32.
3. Implement Parity Check using the following techniques
   a) Single Dimensional Data
   b) Multi Dimensional Data
4. Implement the Even and Odd parity.
5. Impelementation of Data Link Protocols
   a) Unrestricted Simplex Protocol
   b) Stop and wait Protocol
   c) Noisy Channel
6. Impelementation of Sliding Window Protocols
   a) One bit sliding window protocol
   b) Go Back N sliding window protocol
   c) Selective Repeat sliding window protocol
7. Write a code simulating ARP /RARP protocols
8. Impelementation of Routing Protocols
   a) Dijkstra's algorithm
   b) Distance Vector routing protocol
   c) Link State routing protocol
9. Implement the congestion algorithms
   a) Token bucket algorithm
   b) Leaky bucket algorithm
10. Implement DES algorithm.
11. Implement RSA algorithm.
12. Write a program to implement client-server application using TCP

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4thEdition, TMH, 2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, Pearson Education/PHI.

REFERENCES:
1. P.C .Gupta, **"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**, 2nd Edition, Pearson   Education.
3. W.A. Shay, **"Understanding communications and Networks"**, 3rd Edition, Cengage   Learning.

Course Outcomes:
At the end of the course, students will be able to
1. **Implement** the various protocols.
2. **Analyze** various Congestion control mechanisms.
3. **Implement** encryption mechanisms using Symmetric Key and Asymmetric Key algorithms.

COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3										2		
CO2		3												2	
CO3			1										2		

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80610	PYTHON PROGRAMMING LAB	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL
Course Objectives:
This course enables the students to develop various applications using python.

Software Requirements: Python
List of Programs:
 1. a) Run instructions in Interactive interpreter and a Python Script.
   b) Write a program to purposefully raise Indentation Error and correct it.
 2. a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).
   b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
 3. a) Write a Program for checking whether the given number is a even number or not.
   b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . .   . , 1/10.
   c) Write a program using a for loop that loops over a sequence. What is sequence?
   d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
 4. a) Find the sum of all the primes below two million.
   Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
   b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.
 5. a) Write a program to count the numbers of characters in the given string and store them in a dictionary data structure
   b) Write a program to use split and join methods in the given string and trace a birthday with a dictionary data structure.
 6. a) Write a program to combine two lists into a dictionary.
   b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
 7. a) Write a program to print each line of a file in reverse order.
   b) Write a program to compute the number of characters, words and lines in a file.
 8. a) Write a function ball _collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
 Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius .If (distance between two balls centers) <= (sum of their radii) then (they are colliding)
   b) Find mean, median, mode for the given set of numbers in a list.

9. a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

   b) Write a function dups to find all duplicates in the list.

   c) Write a function unique to find all the unique elements of a list.

10. a) Write a function cumulative_product to compute cumulative product of a list of numbers.

   b) Write a function reverse to reverse a list. Without using the reverse function.

11. a) Write a program that defines and print a matrix.

   b) Write a program to perform addition of two square matrices.

   c) Write a program to perform multiplication of two square matrices.

12. a) Install packages requests, flask and explore them.

   b) Write a script that imports requests and fetch content from the page.

   c) Write a simple script that serves a simple HTTP Response and a simple HTML Page.

   d) Write a program to implement class for ATM and include functions required for it.

TEXT BOOKS:
1. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson Publications.
2. Mark Lutz," Learning Python", Orielly Publishers

REFERENCES:
1. Allen Downey, "Think Python", Green Tea Press
2. W. Chun, "Core Python Programming", Pearson.
3. Kenneth A. Lambert, "Introduction to Python", Cengage

Course Outcomes:
At the end of the course, students will be able to
   1. **Develop** simple applications using python.
   2. **Make use of** functions in python scripts.
   3. **Deploy** applications and packages necessary for applications.

<table>
<tr><th colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td>1</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td>1</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>1</td><td>1</td></tr>
<tr><td>CO3</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>2</td><td>3</td></tr>
</table>

Prerequisites: NIL

Course Objectives: To understand the importance of Indian Constitution, Administration, concept and development of Human Rights, Election Commission.

MODULE-I [06 Periods]

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution- Sources and constitutional history, Features- Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

MODULE-II [07 Periods]

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions; **State Government and its Administration** Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

MODULE-III [06 Periods]

A.Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,

B.Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

MODULE-IV [07 Periods]

Concept and Development of Human Rights: Meaning Scope and Development of Human Rights, United Nations and Human Rights – UNHCR, UDHR 1948, ICCPR 1996 and ICESCR 1966, **Human Rights in India:** Protection of Human Rights Act, 1993 (NHRC and SHRC), First, Second and Third Generation Human Rights, Judicial Activism and Human Rights.

MODULE-V [06 Periods]

Election Commission: Election Commission- Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics

4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:
1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course outcome:
At the end of the course, the student will be able to:
1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission.

COS	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1	2	3				
CO2						1	2	3				
CO3						1	2	3				
CO4						1	2	3				
CO5						1	2	3				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80A03	**INTERNSHIP - II**	L	T	P
Credits: NIL		-	-	-

Prerequisites: NIL

Course Objectives: EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis

MODULE-1 Business Environment and Managerial Economics   [10 Periods]

Business Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).

Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE – II   Theory of Production and Cost Analysis   [10 Periods]

Theory of Production: Production Function – ISOquants and ISOcosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break- even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE – III   Market structures and Pricing Policies   [09 Periods]

A. Introduction to Markets & Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

B. Pricing Policies & Methods: Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

MODULE – IV   Capital and Capital Budgeting   [09 Periods]

Capital: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE – V Financial Accounting and Ratios   [10 Periods]

Financial Accounting: Introduction, Accounting principles, Accounting Cycle, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis Through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:
1. Aryasri, "**Managerial Economics and Financial Analysis**", TMH, 2nd edition, 2005.
2. Varshney & Maheswari, "**Managerial Economics**", 5th edition Sultan Chand, 2003

REFERENCES:
1. H. Craig Peterson & W. Cris Lewis, "**Managerial Economics**", PHI, 4th Edition.
2. Domnick Salvatore, "**Managerial Economics In a Global Economy**", Thomson, 4th Edition.
3. Raghunatha Reddy & Narasimhachary, "**Managerial Economics& Financial Analysis**", 4th Edition Scitech.
4. S.N.Maheswari & S.K. Maheswari, "**Financial Accounting**", 6th Edition Vikas.
5. Dwivedi, "**Managerial Economics**", Vikas, 6th Edition.

E-RESOURCES:
1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://nptel.ac.in/courses/110105067/
3. http://nptel.ac.in/courses/110107073/
4. http://nptel.ac.in/courses/110101005/
5. http://nptel.ac.in/courses/109104073/

Course Outcomes:
At the end of the course, students will be able to
1. Understand the concepts of managerial economics and their application in evaluating the demand.
2. Evaluate the production function and identifies the least cost combination to control the costs of production.
3. Understand the structures of various market types and their pricing policies.
4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2							1		3	
CO2	3			2	1							
CO3		1			2						3	
CO4	2	1			3							
CO5		1			2						3	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80520	**DESIGN AND ANALYSIS OF ALGORITHMS**	L	T	P
Credits: 3		3	-	-

Prerequisites: Data Structures

Course Objectives:

This course will make students to analyze asymptotic performance of algorithms, understand different methods like divide and conquer, greedy and graph theory. It also helps to develop solutions to the problems that arise with dynamic programming method by applying backtracking techniques on different applications and synthesizing branch and bound, NP problems.

MODULE I: Basics of Algorithm Design [09 Periods]

Introduction -Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations, Amortized analysis.

Disjoint Sets -Disjoint set operations, union and find algorithms, spanning trees, connected components and bi connected components.

MODULE II: Algorithm Methods [10 Periods]

Divide and Conquer - General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication

Greedy method General method, applications-Job sequencing with deadlines, general knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

MODULE III: Dynamic Programming and Optimization Techniques

[10 Periods]

A: Dynamic Programming - General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem .

B: Optimization Techniques - All pairs shortest path problem, travelling sales person problem, Reliability design.

MODULE IV: Backtracking and Branch and Bound [10 Periods]

Backtracking-General method, n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles

Branch and Bound - General method, applications: Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

MODULE V: NP-Hard and NP-Complete problems [09 Periods]

NP-Hard and NP-Completeness: Basic concepts, NP - Hard and NP Complete classes, Cook's theorem, Deterministic and Non-Deterministic algorithms, NP-hard graph problems and scheduling problem

TEXT BOOKS:
1. Ellis Horowitz, Satraj Sahni and Rajasekharan, **"Fundamentals of Computer Algorithms"** Galgotia publications pvt. Ltd
2. T.H.Cormen,C.E.Leiserson, R.L.Rivest,and C.Stein, **"Introduction to Algorithms"**, second edition, PHI Pvt. Ltd./ Pearson Education

REFERENCES:
1. M.T.Goodrich and R.Tomassia **"Algorithm Design, Foundations, Analysis and Internet examples"**, John wiley and sons.
2. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, **"Introduction to Design and Analysis of Algorithms A strategic approach"**, Mc Graw Hill.
3. Parag Himanshu Dave, Himanshu Balchandra Dave,**"Design and Analysis of algorithms"** Pearson

E-RESOURCES:
1. https://comsciers.files.wordpress.com/2015/12/horowitz-and-sahani-fundamentals-of-computer-algorithms-2nd-edition.pdf
2. https://books.google.co.in/books?id=7qKXCzF1XC8C&printsec=frontcover&dq=T.H.Cormen,C.E.Leiserson,+R.L.Rivest,and+C.Stein,+%22Introduction+to+Algorithms%22,+second+edition,+PHI+Pvt.+Ltd./+Pearson+Education,ebook,pdf&hl=en&sa=X&ved=0ahUKEwjFupORxdXTAhXLQo8KHU7FC5cQ6AEIKjAB#v=onepage&q&f=false
3. http://en.cnki.com.cn/Article_en/CJFDTOTAL-JFYZ200208019.htm
4. http://nptel.ac.in/courses/106101060/

Course Outcomes:
At the end of the course, students will be able to
1. **Analyze** performance of algorithms using asymptotic notations
2. **Describe** and analyze paradigms for designing good algorithms using Divide-and-Conquer and Greedy Techniques.
3. **Synthesize** dynamic-programming algorithms, and analyze them
4. **Learn** and apply backtracking and branch and bound techniques to solve some complex problems.
5. **Apply** algorithm design techniques to solve certain NP-complete problems.

COs	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak			

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	3	3
CO2	2	2	3										3	3	3
CO3	1	2	3										3	3	3
CO4	2	2	3										3	3	3
CO5	3	2	3										1		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80613	**DATA MINING**	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course provides the students to understand stages in building a Data Warehouse, identify the need and importance of preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.

MODULE I: Introduction and Mining Issues & Data   [09 Periods]
Introduction - Why Data Mining? What Is Data Mining? What Kinds of Data Can Be mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted?
Mining Issues and Data - Major Issues in Data Mining, Types of Data, Data Quality

MODULE II: Data, Measuring Data Similarity and Dissimilarity   [10 Periods]
Data - Data Pre-processing, Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature Creation, Data Discretization and Binarization, Variable transformation.
Measuring Data Similarity and Dissimilarity - Similarity and Dissimilarity between simple attributes, Dissimilarities and similarities between data objects, Examples of Proximity measures, Issues in Proximity Calculation, Selection of right proximity measure.

MODULE III: Classification and Techniques   [09 Periods]
A: Classification - Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree.
B: Techniques -Methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

MODULE IV: Classifier and Association Analysis   [10 Periods]
Classifiers - Alterative Techniques**,** Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks
Association Analysis - Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm.

MODULE V: Cluster Analysis and DBSCAN   [10 Periods]
Cluster Analysis - Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm

DBSCAN - Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses.

TEXT BOOKS:
1. Pang-Ning Tan & Michael Steinbach, "**Introduction to Data Mining**", Vipin Kumar, Pearson.
2. Jiawei Han, Michel Kamber,"**Data Mining concepts and Techniques**", 3/e, Elsevier.

REFERENCES:
1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**", Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"**Data Mining and Analysis -fundamental Concepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith ,"**Data Warehousing Data Mining & OLAP**" , TMH.

E-RESOURCES:
1. http://www-users.cs.umn.edu/~kumar/dmbook/index.php
2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
3. http://www.ijctee.org/files/Issuethree/IJCTEE_1111_20.pdf
4. http://www.ccsc.org/southcentral/E-Journal/2010/Papers/Yihao%20final%20paper%20CCSC%20for%20submission.pdf
5. https://gunjesh.wordpress.com/

Course Outcomes:
At the end of the course, students will be able to
1. **Acquire** knowledge in building a Data Warehouse
2. **Understand** the need and importance of preprocessing techniques
3. **Implement** Similarity and dissimilarity techniques
4. **Analyze** and evaluate performance of algorithms for Association Rules.
5. **Deploy** Classification and Clustering algorithms

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	1							1	1		2
CO3	1	1	1	2	1							1	1		1
CO4	1	1	1	1	1							1	1	1	1
CO5	1	2	2	2	2							2	2	1	3

Professional Elective – IV

Prerequisites: NIL

Course Objectives:

This course aims the students to learn the essentials of mobile apps development, aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.

MODULE I: Mobile and Information Architecture   **[10 Periods]**

Introduction to Mobile - A brief history of Mobile, The Mobile Eco system, Why Mobile? Types of Mobile Applications.

Mobile Information Architecture - Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

MODULE II: Introduction to Android and Installation   **[10 Periods]**

Introduction to Android - History of Mobile Software Development, The Open Handset Alliance-Android platform differences.

Android Installation - The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building a Sample Android application.

MODULE III: Android Application Design and Settings   **[10 Periods]**

A: Android Application Design Essentials - Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.

B: Android File Settings - Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, working with different types of resources.

MODULE IV: Android UID and Techniques   **[09 Periods]**

Android User Interface Design - Essentials User Interface Screen elements, Designing User Interfaces with Layouts.

Animation Techniques - Drawing and Working with Animation- Drawing on the screen –Working with Text-Working with Bitmaps-Working with shapes-Working with animation.

MODULE V: Android APIs-I & APIs-II   **[09 Periods]**

Android APIs-I - Using Common Android APIs Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers.

Android APIs-II - Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:

1. James Keogh, **"J2ME: The Complete Reference"**, Tata McGrawHill.

2. Lauren Darcey and Shane Conder, **"Android Wireless Application Development",** Pearson Education, 2nd ed. (2011).

REFERENCES:
1. Reto Meier, **"Professional Android 2 Application Development",** Wiley India Pvt Ltd.
2. Mark L Murphy, **"Beginning Android"**, Wiley India Pvt Ltd.
3. Barry Burd, **"Android Application Development All in one**" 1st edition, Wiley India Pvt Ltd.

E-RESOURCES:
1. http://onlinevideolecture.com/ebooks/?subject=Android-Development
2. https://developer.android.com/training/basics/firstapp/index.html
3. IEEE Transactions on Mobile Computing
4. International Journal of Interactive Mobile Technologies
5. http://nptel.ac.in/courses/106106147/

Course Outcomes
At the end of the course, students will be able to
1. **Classify** different types of Platforms.
2. **Appreciate** the Mobility landscape.
3. **Familiarize** with Mobile apps development aspects.
4. **Design** and **develop** mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
5. **Perform** testing, signing, packaging and distribution of mobile apps.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3											1		
CO2			3		3										
CO3			3		3										
CO4				2			1							3	
CO5							1		3			3		3	

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80614	INTERNET OF THINGS [Professional Elective – IV]	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic knowledge of computer architecture, programming and communication protocols

Course Objectives:
Understand the basics of Embedded System, IoT and the development model. Understand the architecture, Instruction set and work on ARM microcontroller using practical hands-on. Ability to select appropriate hardware and microcontrollers based on need of application. Understand the Internet of Things Standards, Frameworks and Techniques. Apply the tools, techniques and skills acquired towards development of Projects.

MODULE I - Introduction to Embedded Systems and Internet of Things (IOT)
[09 Periods]
Architecture of Embedded Systems , Embedded Systems Development process, Architecture of Internet of Things , Applications of Embedded Systems and IoT, Design Methodology for IOT Products

MODULE II - Overview of Open Source Hardware and Its relevance to IOT
[09 Periods]
Introduction and Programming Arduino Development Board , Working with Sensor Integration, Interfacing Input / Output devices (Pot, LDR, LCD, etc), Introduction to Network Connectivity, Concepts of IP based communication, Client – Server model of communication, Introduction to Wi-Fi communication using ESP8266, ESP8266 in Station & Access Point Mode

MODULE III – Fundamentals of Python Programming & Raspberry PI
[10 Periods]
A: Introduction to python programming, working with functions, classes, REST full Web Services, Client Libraries.
B: Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3

MODULE IV – IOT Platform: Cloud Computing Platforms for IOT
Development (IBM Cloud) **[10 Periods]**
IOT Platform Architecture (IBM Internet of Things & Watson Platforms), API Endpoints for Platform Services , Devices Creation and Data Transmission, Introduction to NODE-RED and Application deployment

MODULE V – IOT Usecases: Smart city Project & Industrial Usecases
[10 Periods]

Introduction to Smart City Project & IOT Use cases , Development of Smart city Applications , Project Work -1 (Smart city Use case) , Project Work-2 (Industrial Use case)

TEXT BOOKS:
1. Internet of Things: A Hands-On Approach by by Arsheep Bahga, Vijay Madisetti
2. The Internet of Things: Key applications and Protocols ‖ Wiley Publications 2nd Edition

REFERENCES:
1. Embedded Systems: Real-Time Interfacing to Arm(r) Cortex -M Microcontrollers: Volume-1 & 2 by Jonathan W Valvano
2. Designing the Internet of Things‖ by Adrian McEwen, Hakim Cassimally, Wiley Publications, 2012
3. Embedded Real Time Systems: Concepts, Design and Programming‖ by Dr.K.V.K.K.Prasad, DreamTech Publication, 2003.

E-RESOURCES:
1. http://www.itu.int/en/ITU-T/gsi/iot/Pages/default.aspx
2. http://electronicdesign.com/embedded/understanding-protocolsbehind-internet-things
3. http://eclipse.org/community/eclipse_newsletter/2014/february/articl e2.php
4. http://iot.eclipse.org/protocols.html
5. http://www.slideshare.net/paolopat/internet-ofthingsprotocolswar
6. http://www.slideshare.net/RealTimeInnovations/io-34485340
7. http://www.networkworld.com/article/2456421/internet-of-things/aguide-to-the-confusing-internet-of-things-standards-world.html

Course Outcomes:
At the end of the course, students will be able to
1. **Describe** the fundamental concepts of IoT and its applications
2. **Illustrate** M2M concepts with protocols.
3. **Develop** applications using Python Scripting Language.
4. **Build** real world applications by applying Raspberry PI.
5. **Examine** web based services.

	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3								3	3	3
CO4	3	3	3	3	3	3							3	3	3
CO5	3	3	3	3	3								3	3	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80531	ADVANCED COMPUTER ARCHITECTURE [Professional Elective – IV]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Organization.
Course Objectives:
This course helps to explore on the advanced concepts and state-of-the-art developments in computer architecture: memory systems, pipelining, simultaneous multithreading, run-time optimization, array processing, parallel processing, multiprocessing, abstract analytic models, power-aware computing, embedded computing, relationship between computer design and application requirements, cost/performance tradeoffs, and many example computers of interesting and unusual features.

MODULE I: [09 Periods]
Fundamentals of Computer design- Technology trends- cost price and their trends- measuring and reporting performance - quantitative principles of computer design

MODULE II: [09 Periods]
Instruction set principles and examples- Classifying instruction set architecture - memory addressing- type and size of operands- operations in the instruction set- instructions for control flow- encoding an instruction set.

MODULE III: [10 Periods]
Instruction level parallelism (ILP)and its dynamic exploitation – Concepts and challenges-overcoming data hazards- reducing branch costs with dynamic hardware prediction – high performance instruction delivery- hardware based speculation ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time.

MODULE IV: [10 Periods]
Memory hierarchy design- Cache performance- reducing cache misses penalty and miss rate – virtual memory. Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading

MODULE V: [10 Periods]
Storage systems - Types – Buses - RAID- errors and failures - designing an I/O system in five easypieces. Inter connection networks and clusters - interconnection network media – practical issues in interconnecting networks – clusters- designing a cluster

TEXT BOOKS:
1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kaufmann (An Imprint of Elsevier)

 REFERENCES:

1. Kai Hwang and A.Briggs "Computer Architecture and parallel Processing" International Edition McGraw-Hill.
2. DezsoSima, Terence Fountain, Peter Kacsuk "Advanced Computer Architectures", Pearson.

Course Outcomes:
At the end of the course, students will be able to:
1. Understand and apply concept and principle of cache memory and virtual memory to high -performance computer architecture.
2. Understand pipelining and its speed advantage & design pipelined logic.
3. Proficient in fault-tolerant design techniques and examine various methods of error detection and correction such as TMR and Hamming Codes.
4. Identify tradeoffs between complex instruction set computers (CISC) and reduced instruction set computers (RISC).
5. Analyze and perform tradeoffs between the cost, performance, and reliability of alternative computer architectures.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3									2	3		
CO2			3										3	2	
CO3			3				2					2		3	
CO4	2	2	3				2					2	2		
CO5	2	2	3									2			2

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:	**Open Elective - I**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:80H03	ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Pre-requisites: NIL
Course Objectives:
The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make the learners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.

Methodology: Facilitator's role: Since classroom learning augments thinking process, helping them to develop written, spoken and non verbal communication, the facilitator / Faculty would briefly discuss the topics with the students and later on guide them while the students involved in activities, writing work and while making presentations. The facilitator is required to design a lot of practical/industry oriented project works for the students
*Students are required to participate, perform, write and submit the work in the form of written documents or Power Point Presentations to hone their spoken written and non verbal communication skills. Students are to take up field work and submit the project work.

MODULE I: Oral Presentation
Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbal communication during presentations– Nuances of Presentation.
*This particular MODULE is for internal evaluation purpose(s).

MODULE II: E - Correspondence and Email etiquette
Common web mail services, yahoo, gmail etc, fields to pay attention- To:, Cc:, Bcc:, Reply All, Subject, Salutation, Body, Signature, Font, Caps Lock , Highlight, The 'KISS' strategy   (Keep It Simple and Short,)Points to remember while signing off, Introduction to Technical Vocabulary.
• This MODULE is purely for internal assessment/evaluation

MODULE III: Group Discussion
Initiators- Contributor-Informer-Team Leader-Motivator-Creative Contributor , Importance of , Non verbal communication -eye contact, voice characters, posture, gestures, do's and don'ts, Role play and Simulation- Learners assuming the roles of characters and participating in Group discussion, analysis, or prediction with strictly defined goals.

MODULE IV: Interview Skills & Office Etiquette
Preparing for the interview, types of interviews, interview session, importance of non verbal communication during the interview, do's and don'ts of interview, follow up and thanking letter. FAQ's. Formal Conversation, office attire- do's and don'ts,

greetings and meetings, speaking to seniors and handshakes, offering and taking visiting cards.

MODULE V: Job Hunt Process
SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's -electronic, video and printed resume's
- Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

REFERENCES:
1. Chrissie: **Handbook of Practical Communication Skills**: Jaico Publishing house, 1999.
2. Daniels, Aubrey: **Bringing Out the Best in People**: Tata McGraw-Hill: New York, 2003.
3. Wright, Goulstone, Mark: **Just Listen: Discover the Secret to getting through to absolutely anything** : American Management Association, 2010.
4. Leslie. T. Giblin: **Skill with people** Publication details not known
5. Lewis, Norman: **Word Power Made Easy**: Goyal Publications: New Delhi, 2009.
6. Murthy, A.G, Krishna,: **Ten Much** : Tata McGraw-Hill :New Delhi, 2010.

E-RESOURCES:
1. http://www.mindtools.com/pages/article/newTMC_05.htm
2. http://www.kent.ac.uk/careers/intervw.htm
3. http://www.wikihow.com/Write-a-Report

Course Outcomes:
At the end of the course, students will be able to
1. Give Oral Presentations Confidently.
2. Draft appropriate Resume in accordance with the context.
3. Participate and present their view and ideas logically and confidently.
4. Understand the importance of communication in various settings.
5. Utilize the technology for career advancement.

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1					2		2
CO2										1		2
CO3		1		1						2		2
CO4					1	1			1	2		2
CO5				1	1				1	2		2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80615	DATA MINING LAB	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL
Course Objectives:
This course provides the students to understand stages in building a Data Warehouse, identify the need and importance of preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.

Software Requirements: WEKA TOOL
List of Programs:
1. Demonstration of preprocessing on dataset student.arff.
2. Implementation of preprocessing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori Algorithm.
4. Implement Association rule process on dataset test.arff using apriori algorithm.
5. Apply classification rule process on dataset student.arff using j48 algorithm.
6. Perform classification rule process on dataset employee.arff using j48 algorithm.
7. Use classification rule process on dataset employee.arff using id3 algorithm.
8. Deploy classification rule process on dataset employee.arff using naïve bayes Algorithm.
9. Implement clustering rule process on dataset iris.arff using simple k-means.
10. Make use of clustering rule process on dataset student.arff using simple k- means.
11. Design a decision tree by pruning the nodes on your own. Convert the decision trees into "if- then-else rules". The decision tree must consists of 2-3 levels and convert it into a set of rules.
12. Generate Association rules for the following transactional database using Apriori algorithm.

TID	List of Items
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5

TEXT BOOKS:
1. Pang-Ning Tan & Michael Steinbach, "**Introduction to Data Mining**",Vipin Kumar, Pearson.
2. Jiawei Han, Michel Kamber ,"**Data Mining concepts and Techniques**", 3/e, Elsevier.

REFERENCES:

1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**", Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"**Data Mining and Analysis - Fundamental Concepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith ,"**Data Warehousing Data Mining & OLAP**" , TMH.

Course Outcomes:

At the end of the course, students will be able to

1. **Analyze** the classification rules on various databases.
2. **Deploy** association rules for any kind of databases.
3. **Develop** clustering rules for applications.

<table>
<tr><th colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>CO2</td><td>1</td><td>2</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td>CO3</td><td>1</td><td>2</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td>2</td></tr>
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2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80609	ANDROID APPLICATION DEVELOPMENT LAB	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL
Course Objectives:
The main objective of this course makes the students to know the components and structure of mobile application development frameworks for Android and windows OS based mobiles, deploy various mobile application development frameworks, analyze important design concepts and issues of development of mobile applications, understand the capabilities and limitations of mobile devices.

List of Experiments:
1. Installation of Eclipse, Android SDK, Building a Sample Android application.
2. Develop an application that uses GUI components, Font and Colors.
3. Develop an application that uses Layout Managers and event listeners.
4. Develop a native calculator application.
5. Write an application that draws basic graphical primitives on the screen.
6. Develop an application that makes use of database.
7. Develop an application that makes use of RSS Feed.
8. Implement an application that implements Multi threading.
9. Develop a native application that uses GPS location information.
10. Implement an application that writes data to the SD card.
11. Implement an application that creates an alert upon receiving a message.
12. Write a mobile application that creates alarm clock.

TEXT BOOKS:
1. James Keogh, **"J2ME: The Complete Reference"**, Tata McGrawHill.
2. Lauren Darcey and Shane Conder, **"Android Wireless Application Development",** Pearson Education, 2nd ed. (2011).

REFERENCES:
1. Reto Meier, **"Professional Android 2 Application Development",** Wiley India Pvt Ltd.
2. Mark L Murphy, **"Beginning Android"**, Wiley India Pvt Ltd.
3. Barry Burd, **"Android Application Development All in one**" Edition: I, Wiley India Pvt Ltd.

Course Outcomes:
At the end of the course, students will be able to:
1. **Design** and Implement various mobile applications using emulators.
2. **Develop** native android applications using android SDK
3. **Deploy** applications to hand-held devices.

CO- PO, PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3		3								2		
CO2		2	3		3								2		
CO3		2	3		3								2		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:80M03	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (Common for EEE,ECE,CSE and IT)	L	T	P
Credits: NIL		2	-	-

Pre requisites: NIL
Course objectives: To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

MODULE- I [07 Periods]
Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

MODULE-II [06 Periods]
Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

MODULE-III [06 Periods]
A: Legal frame work and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);
B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

MODULE-IV [06 Periods]
Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

MODULE-V [07 Periods]
Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

REFERENCES:
1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

3. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

E- RESOURCES:
1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/

Course outcomes:
At the end of the course, students will be able to:
1. Understand the concept of Traditional knowledge and its importance
2. Know the need and importance of protecting traditional knowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge.
5. Know the various streams of Indian traditional knowledge.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						2		2				2
CO2						2		2				2
CO3						2		2				2
CO4						2		2				2
CO5						2		2				2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80521	**BIG DATA ANALYTICS**	L	T	P
Credits: 3		3	1	-

Prerequisites: Databases, programming fundamentals.
Course Objectives:
This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs, discuss about concepts of big data, make use of Hadoop concepts for designing applications, develop applications using Hadoop I/O and analyze big data using programming tools such as Pig and Hive.

MODULE I: Big data overview, data analytics, and R Language   [09 Periods]
Big Data Overview : Data Structures, Analyst Perspective on Data Repositories , State of the Practice in Analytics, Bl Versus Data Science,   Current Analytical Architecture ,   Drivers of Big Data ,   Emerging Big Data Ecosystem and a New Approach to Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics. Data Analytics Lifecycle , Model Building and Basic Data Analytic Methods Using R Data Analytics Lifecycle Overview,   Key Roles for a Successful Analytics Project,   Background and Overview of Data Analytics Lifecycle - Discovery , Data Preparation,   Learning the Business Domain , Model Planning , Model building, Communicate Results, Operationalize and case study example Global Innovation Network and Analysis (GINA)
R Introduction: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation, Hypothesis Testing, Difference of Means, Rank-Sum Test, Errors, Sample Size data

MODULE II: Working with Big Data   [09 Periods]
Hadoop - Google File System, Hadoop Distributed File System (HDFS)– Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker).
Configuring of Hadoop Cluster -   Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

MODULE III: Hadoop API and Map Reduce Programs   [09 Periods]
A: Hadoop API - Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New)
B: MapReduce Programs with classes -   Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

MODULE IV: Hadoop I/O and Implementation   [09 Periods]
Hadoop I/O - The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections.
Implementation - Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators.

MODULE V: PIG and HIVE HADOOP TOOL   [12 Periods]
PIG - HADOOP TOOL -   Hadoop Programming Made Easier - Admiring the Pig
Architecture, Going with the Pig Latin Application Flow, Working through the ABCs
of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts,
Checking out the Pig Script Interfaces, Scripting with Pig Latin.
HIVE – HADOOP TOOL - Saying Hello to Hive, Seeing How the Hive is Put
Together, Getting Started with Apache Hive, Examining the Hive Clients, Working
with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the
Hive Data Manipulation Language Works, Querying and Analyzing Data.

TEXT BOOKS:
1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and
Presenting Data EMC Education Services, Wiley Publishers, 2015.
2. Cay Horstmann, Wiley John Wiley & Sons, "**Big Java**", 4th Edition, INC
3. Tom White, "**Hadoop: The Definitive Guide**" 3rd Edition, O'reilly

REFERENCES:
1. Alex Holmes, "**Hadoop in Practice**", MANNING Publ.
2. Srinath Perera, Thilina Gunarathne, "**Hadoop MapReduce**" Cookbook.

E-RESOURCES:
1. http://newton.uam.mx/xgeorge/uea/Lab_Prog_O_O/materiales_auxiliares/Big_Jav
   a_4th_Ed.pdf
2. http://www.isical.ac.in/~acmsc/WBDA2015/slides/hg/Oreilly.Hadoop.The.Definit
   ive.Guide.3rd.Edition.Jan.2012.pdf-
3. https://static.googleusercontent.com/media/research.google.com/en//archive/mapr
   educe-osdi04.pdf
4. http://www.comp.nus.edu.sg/~ooibc/mapreduce-survey.pdf
5. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/18
6. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/40

Course Outcomes:
At the end of the course, students will be able to
1. **Develop** simple applications using R language
2. **Analyze** file systems such as GFS and HDFS.
3. **Design** applications by applying Map reduce concepts.
4. **Build** up programs by making use of I/O.
5. **Explore** and inspect the big data using programming tools like Pig and Hive.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
CO1	3	3	3	3	3	1		1	3	2	1	3	3	2	3
CO2	3	2	3	3	3						2	1	3	2	2
CO3	3	3	3	3	3							3	3	2	2
CO4	3	3	3	3	3						1	3	3	2	2
CO5	2	3	3	3	3						1	3	3	2	2

Prerequisites: NIL

Course Objectives:

This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.

Module I: Python programming -Machine Learning (ML)   **[10 Periods]**

Introduction to Python:

Python, expression, variables, assignment statements, functions, built in function, strings, modules, lists, making choice (Boolean, if, storing conditional statements), repetition(loops, while, counted loops, user input loops, control loops , style notes), File processing(one record per line, records with multiple fields, positional data, multiline records, looking ahead, writing files), sets and dictionaries(sets, dictionaries, inverting a dictionary), Algorithms with suitable example. Construction of functions, methods, Graphical user interfaces, databases and applications.

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in ML

Concept Learning - Introduction, Concept Learning task, Concept learning as search, Find-S: Finding a maximally specific hypothesis, Version spaces and candidate elimination algorithm, Remarks on version spaces and Candidate elimination, Inductive bias.

Module II: Decision Tree Learning and ANN   **[09 Periods]**

Decision Tree learning - Introduction, Decision Tree representation, Appropriate Problems, Decision Tree learning algorithm, Hypothesis Space Search, Inductive bias, Issues.

Artificial Neural Networks - Introduction, Neural network representation, Problems for Neural Network Learning, Perceptions, Multilayer networks and Back Propagation algorithm, Remarks on back propagation algorithm, Evaluation Hypotheses, Motivation, Estimation hypothesis accuracy, Sampling theory, General approach for deriving confidence intervals, Difference in error of two hypotheses,

Module III: Bayesian learning and Instance based Learning   **[10 Periods]**

A: Bayesian learning - Introduction and concept learning, Maximum Likelihood and Least Squared Error Hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle.

B: Instance-based Learning - K -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Lazy and Eager Learning, Genetic Algorithm: Motivation, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Module IV: Rules and Analytical Learning   **[09 Periods]**

Learning Sets of Rules - Introduction, Sequential Covering Algorithms, Learning Rule Sets: Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

Module V: Learning Techniques   [10 Periods]
Combining Inductive and Analytical Learning - Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to initialize Hypothesis, Using Prior Knowledge to alter Search Objective, Using Prior Knowledge to Augment Search Operators.

Reinforcement Learning - Introduction, Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:
1. Jennifer Campbell paul Gries Jason Montojo Greg Wilson, "Practical Programming" An introduction to Computer Science Using Python
2. Tom M. Mitchell, "**Machine Learning**", MGH, 1st Edition, 2013.
3. Stephen Marsland, "**Machine Learning: An Algorithmic Perspective**", Chapman and Hall / CRC, 2nd Edition, 2014.

REFERENCES:
1. Neural Networks, William WHsieh, "**Machine Learning Methods in the Environmental Sciences**"
2. Richard O. Duda, Peter E. Hart and David G. Stork, "**Pattern Classification**", John Wiley & Sons Inc., 2001
3. Chris Bishop, "**Neural Networks for Pattern Recognition**", Oxford University Press, 1995

E-RESOURCES:
1. http://www.zuj.edu.jo/download/machine-learning-tom-mitchell-pdf/
2. https://goo.gl/FKioSh
3. http://www.ntu.edu.sg/home/egbhuang/pdf/ieee-is-elm.pdf
4. www.fxpal.com/publications/a-genetic-algorithm-for-video-segmentation-and-summarization.pdf
5. http://nptel.ac.in/courses/106106139/
6. http://nptel.ac.in/courses/106105152/

Course Outcomes:
At the end of the course, students will be able to
1. **Formulate** machine learning problems corresponding to different applications.
2. **Understand** a range of machine learning algorithms like decision trees, and ANN.
3. **Apply** Machine Learning algorithms, Bayesian and Instance based Learning techniques.
4. **Use** of machine learning algorithms to solve problems using rules, and analytical learning techniques
5. **Illustrate** the Combining Inductive and Analytical Learning and applications of Reinforcement Learning

COs	\multicolumn{12}{c}{Programme Outcomes(POs)}											\multicolumn{3}{c}{PSOs}		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1		1		1						1	1		
CO2	1	2	1	1	1	1						1		2	1
CO3	1	1	2	2	1	1						2		2	2
CO4	1	1	1	2	1	1						3		1	2
CO5	1	1	1	1	1	1						2		1	2

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Professional Elective - V

Prerequisites: Formal Languages and Automata Theory

Course Objectives:

This course provides a broad introduction to NLP to determine whether the algorithm answers the goals of its designers, or if the system meets the needs of its users. And to demonstrate NLP with regular expression, Python programming, demonstrate Context Free Grammar, Probability theory to analyze various models of language, implement Naive Bayes, HMM, explore in detail about Probabilistic Context Free Grammars, Models, parsers and classifiers, grammar and techniques.

Module I: Introduction and Regular Expressions   [10 Periods]

Natural Language Processing (NLP) - Introduction to NLP, Hands-on demonstrations, Ambiguity and uncertainty in language, Turing test, Chomsky hierarchy, regular languages, and limitations, Finite-state automata, Practical regular expressions for finding and counting language phenomena.

Programming in Python - Programming in Python and String Edit Distance and Alignment: An introduction to programming in Python, Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. NLTK, String Edit Distance and Alignment Key algorithmic tool: Dynamic programming, String edit operations, Edit distance, and examples of use in spelling correction, and machine translation.

Module II: Context Free Grammars and Probability   [09 Periods]

CFG - Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down and Bottom-up parsing, Non-probabilistic Parsing Efficient CFG parsing with CYK, Dynamic programming algorithms, Early parser, Designing a little grammar, and parsing with test data.

Probability - Introduction to probability theory, Joint and conditional probability, marginal, independence, Bayes rule, combining evidence. Example applications. Information Theory: "Shannon game", Entropy, cross entropy, information gain, Application to language phenomena.

Module III: Language Models   [10 Periods]

A: Language Modeling and Naive Bayes - Probabilistic language modeling and its applications, Markov models, N-grams, Estimating probability of a word, and smoothing. Generative models of language.

B: Part of Speech Tagging and Hidden Markov Models - Viterbi Algorithm for Finding Most Likely HMM Path, Dynamic programming with HMM, Use for part-of-speech tagging, Chinese word segmentation, prosody, Information extraction.

Module IV: Probabilistic and Classifiers   [10 Periods]

Probabilistic Context Free Grammars - Weighted context free grammars, Weighted CYK, Pruning and beam search, Parsing with PCFG, Probabilistic version of CYK, Human parsing, Experiments with Eye-Tracking.

Parsers and Classifiers - Modern parsers, Maximum Entropy Classifiers-The maximum entropy principle and its relation to maximum likelihood, Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks.

Module V: Grammar and Techniques   [09 Periods]
Grammar - Maximum Entropy Markov Models & Conditional Random Fields, Part-of-speech tagging, Noun-phrase Segmentation and Information Extraction Models, Finite-state machines.
Models and Techniques - Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Information Extraction & Reference Resolution - Various methods including HMMs, Models of Anaphora Resolution, Machine Learning Methods for Co-reference.

TEXT BOOKS:
1. Jurafsky and Martin, "**Speech and Language Processing**", Prentice Hall
2. Manning and Schutze, "**Statistical Natural Language Processing**", MIT Press

REFERENCES:
1**.** Cover, T. M. and J. A. Thomas, "**Elements of Information Theory**", Wiley.
2. James Allen, "**Natural Language Understanding**", The Benajmins/Cummings Publishing Company

E-RESOURCES:
1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/revised.pdf
2. https://hpi.de/fileadmin/user_upload/fachgebiete/plattner/teaching/NaturalLanguageProcessing/NLP2016/NLP01_IntroNLP.pdf
3. http://www.sciencedirect.com/science/article/pii/S1532046401910299
4. http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.34.1r036
5. http://nptel.ac.in/courses/106101007/
6. http://nptel.ac.in/courses/106105158/

Course Outcomes:
At the end of the course, students will be able to
1. **Be able** to compose key NLP elements to develop higher level processing chains and Assess Evaluate NLP based systems and apply Python programming concepts in NLP.
2. **Choose** appropriate solutions CFG, probability for solving typical NLP sub problems
3. **Analyze** NLP problems to decompose them in adequate independent components, models, and its applications.
4. **Evaluate** language technology component use of probabilistic context free grammars, parsers and classifiers.
5. **Elaborate** the interaction between Grammar, models and techniques used in NLP.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											1		
CO2	2	3		1									1	2	1
CO3	1	3		2									1	2	
CO4		2	3		1									2	1
CO5	2	3											2		1

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80533	DEEP LEARNING [Professional Elective - V]	L	T	P
Credits: 3		3	-	-

Prerequisites: Machine Learning

Course Objectives:
This course aims to present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.

MODULE I: INTRODUCTION [09 periods]
Feed forward Neural networks, Gradient descent and the back propagation algorithm. Unit saturation, aka the vanishing gradient problem, and ways to mitigate it. RelU Heuristics for avoiding bad local minima. Heuristics for faster training. Nestors accelerated gradient descent. Regularization. Dropout.

MODULE II: Convolution Neural Networks [09 Periods]
Architectures, convolution / pooling layers, Recurrent Neural Networks LSTM, GRU, Encoder Decoder architectures

MODULE III: Deep Unsupervised Learning [10 Periods]
Auto encoders (standard, sparse, denoising, and contractive, etc), Variational Auto encoders, Adversarial Generative Networks, Auto encoder and DBM Attention and memory models, Dynamic memory networks (2 lectures)

MODULE IV: Applications of Deep Learning to Computer Vision [10 Periods]
Image segmentation, object detection, automatic image captioning, Image, generation with Generative adversarial networks, video to text with LSTM, models. Attention models for computer vision tasks. Applications of Deep Learning to NLP: Introduction to NLP and Vector Space Model of Semantics Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Glove, Evaluations and Applications in word similarity.

MODULE V: Analogy reasoning [10 Periods]
Named Entity Recognition, Opinion Mining using Recurrent Neural Networks Parsing and Sentiment Analysis using Recursive Neural Networks Sentence Classification using convolutional Neural Networks Dialogue Generation with LSTMs Applications of Dynamic Memory Networks in NLP Recent Research in NLP using Deep Learning.

TEXT BOOKS:
1. Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning.

REFERENCES:
1. Duda, R.O., Hart, P.E., and Stork, D.G. Pattern Classification. Wiley-Interscience. 2nd Edition. 2001.

2. Theodoridis, S. and Koutroumbas, K. Pattern Recognition. Edition 4. Academic Press, 2008.
3. Russell, S. and Norvig, N. Artificial Intelligence: A Modern Approach. Prentice Hall Series in Artificial Intelligence. 2003.
4. Bishop, C. M. Neural Networks for Pattern Recognition. Oxford University Press. 1995.
5. Hastie, T., Tibshirani, R. and Friedman, J. The Elements of Statistical Learning. Springer. 2001.
6. Koller, D. and Friedman, N. Probabilistic Graphical Models. MIT Press. 2009.

Course Outcomes:

At the end of the course, students will be able to

1. **Examine** the significant features of neural networks.
2. **Explore** the architecture of various neural networks.
3. **Analyze** the strategy for unsupervised learning.
4. **Elaborate** the various deep learning applications concerned with computer vision.
5. **Investigate** various reasoning methods using deep learning techniques.

COs	Programme Outcomes(POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	1		1						1	1	2	1
CO2	1	2	1	2	1							1	1	2	
CO3	1	3	2	2	1	1						2	1	2	1
CO4	1	3	3	3	1	2						3	2	2	1
CO5	1	3	3	3	1	2						3	2	3	1

Table heading: CO- PO, PSO Mapping — (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80534	**MOBILE COMPUTING** [Professional Elective - V]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL.
Course objectives: To understand the Wireless communication Environment, GSM and MANNET.

MODULE I: Introduction [09 Periods]
Introduction to Mobile Communications and Computing-Mobile Computing (MC): Introduction to MC, Novel applications, Limitations, and Architecture.
GSM-Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

MODULE II: MAC [09 Periods]
A: Motivation for a Specialized MAC (Hidden and Exposed Terminals, Near and Far Terminals).
B: SDMA, FDMA, TDMA, CDMA, MAC Protocols for GSM.

MODULE III: Mobile IP Network Layer [09 Periods]
Mobile IP (Goals, assumptions, entities and terminology, IPpacket delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

MODULE IV: Mobile IP Transport Layer [09 Periods]
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP,Fast retransmit/fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP.

MODULE V: Data Base Issues and Data Dissemination [12 Periods]
Database Issues - Hoarding techniques, caching invalidation mechanisms.
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

TEXT BOOKS:
1. Stojmenovic and Cacute "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002,
2. "Mobile Communications", Jochen Schiller, Addison-Wesley, Second Edition, 2004.

REFERENCES:
1. Reza Behravanfar "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University Press, Oct2004.
2. "Mobile Computing", Raj Kamal, Oxford University Press, 2007
3. "Mobile and Wireless Design Essentials", Martyn Mallick, Wiley DreamTech

Course Outcomes:

At the end of the course, students will be able to :

1. Learn the different wireless communication technologies, understand the protocols used in the layered architecture.
2. Define WLAN and different WLAN transmission technologies.
3. Explain different types of WLANs, learn about GSM.
4. Explain different Wireless Medium Access Control Protocols, explain Mobile Network and Transport Layer Protocols.
5. Explain different routing algorithms used in Mobile Ad hoc Networks (MANET).

COs	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		2		3				3	2	2	2		2	
CO2	2	3	3									2	2		
CO3	2	3	2									2	2	1	
CO4	2	3	2									2		2	
CO5	2	3	2									2	2		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code:	**Open Elective-II**	**L**	**T**	**P**
Credits: 3		**-**	**-**	**3**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80522	**BIG DATA ANALYTICS LAB**	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL

Course Objectives:

This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs.

List of Programs

1. Basics of R programming, Data Analysis using R; Using Hadoop for applying Map-reduce technique: Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times,   Loop functions, debugging tools,   Simulation, code profiling
2. Demonstrate how variables are processed and data is displayed using R.
3. Using a suitable example show that R is case-sensitive.
4. Show how scalars and vectors lists are processed in R.
5. Show how matrices can be added and multiplied in R using an appropriate example.
6. Demonstrate using different colors how graphics is processed and displayed using R.
7. Using appropriate example show how graphs can be displayed using R.
8. Using appropriate example demonstrate statistical analysis using R (For example, calculation of mean, variance etc).
9. Consider any real dataset and demonstrate Linear Regression, Random Forest and CART (Classification and Regression Trees) using R.
10. Consider any real dataset and demonstrate Support Vector Machines (SVM) and Neural Networks using R.
11. Use Apache Hadoop (or Apache Mahout) to demonstrate the Map-reduce model for Naïve Bayes Classification.
12. Use Apache Hadoop (or Apache Mahout) to demonstrate the Map-reduce model for K-means Clustering.

REFERENCES:

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007
3. Machine Learning – Tom M. Mitchell, - MGH
4. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)
5. https://www.r-project.org/
6. https://cran.r-project.org/manuals.html
7. https://mahout.apache.org/

Course Outcomes:

At the end of the course, students will be able to:
1. Apply data analytics for a given problem using R Language.
2. Identify the need for big data analytics for a domain.
3. Use Hadoop, Map Reduce Framework

COs	\multicolumn{12}{|c|}{Programme Outcomes(POs)}												\multicolumn{3}{c}{PSOs}	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1		1		1						1	1	2	
CO2	1	1	2	1	1	1						1	1	1	1
CO3	1	1	2	2	2	1		1	1		1	3	1	3	1

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80612	**MACHINE LEARNING LAB**	**L**	**T**	**P**
Credits: 2		-	1	2

Prerequisites: Computer Programming

Course objectives:

This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.

List of Programs

1. Install the python software/Anaconda- python and install useful package for machine learning load the dataset(sample), understand, and visualize the data
2. Implement simple linear regression
3. Implement multivariate linear regression.
4. Implement simple logistic regression and multivariate logistic regression.
5. Implement decision trees.
6. Implement any 3 classification algorithms.
7. Implement random forests algorithm
8. Implement K-means, KNN algorithms
9. Implement SVM on any applicable datasets.
10. Implement neural networks
11. Implement PCA.
12. Implement anomaly detection and recommendation.

REFERENCES:

1. Machine Learning with Python/Scikit-Learn, - Application to the Estimation of Occupancy and Human Activities, pp. 1-103

Course Outcomes:

At the end of the course, students will be able to:

1. Apply Machine learning approaches for a given problem.
2. Analyze and identify the need for machine learning techniques for a particular domain.
3. Develop the real time applications and predict its outcomes using machine learning algorithms.

<table>
<tr><th colspan="17">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td>1</td><td>1</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>2</td><td></td></tr>
<tr><td>CO2</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>CO3</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td><td>1</td><td></td><td>1</td><td>1</td><td></td><td>1</td><td>3</td><td>1</td><td>3</td><td>1</td></tr>
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2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80P01	**Internship - III/Mini project**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**4**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
		L	T	P
Code: 80P02	**Project Stage I**	-	-	4
Credits: 2				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VIII Semester		
Code: 80618	**INFORMATION SECURITY**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Computer Networks
Course Objectives:
This course enables the students to understand the main concepts of Security services and Attacks, categorize various Conventional Encryption Algorithms, compare various algorithms and fundamental ideas of public-key cryptography, illustrate various E-Mail privacy techniques and infer web security and intrusion detection systems.

MODULE I: Introduction - Security Attacks and Mechanisms   [10 Periods]
Security Attacks - Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability)
Security Mechanisms - A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking and man-in-the-middle attacks.

MODULE II: Encryption   [09 Periods]
Conventional Encryption Principles - Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices.
Key Distribution - key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

MODULE III: Cryptographic Techniques   [10 Periods]
A: Cryptographic Techniques - Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates.
B: Key Management - Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

MODULE IV: Email Privacy   [09 Periods]
Email Privacy - Pretty Good Privacy (PGP) Characteristics of PGP, Cryptographic Keys and Key rings, PGP Message Generation.
S/MIME - S/MIME, MIME Types and Subtypes, Cryptographic algorithms in S/MIME.

MODULE V: IP & Web Security   [10 Periods]
IP Security - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security - Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Basic concepts of SNMP, SNMPv1 Community   facility and SNMPv3. Intruders, Viruses and

related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

TEXT BOOKS:
1. William Stallings "**Network Security Essentials (Applications and Standards)",** 4th Edition,Pearson Education 2011.
2. Behrouz A . Forouzan, **"Cryptography and Network Security"** TMH 2007.

REFERENCES:
1. Eric Maiwald, **"Fundamentals of Network Security**", Dreamtech press.
2. William Stallings, "**Cryptography and network Security**", 3rd Edition, PHI, Pearson.
3. Atul Kahate,"**Cryptography and Network Security**", 2nd edition, TMH.

E-RESOURCES:
1. http://sbmu.ac.ir/uploads/3._Network-security-essentials-4th-edition-william-stallings.pdf
2. https://docs.google.com/file/d/0B5F6yMKYDUbrYXE4X1ZCUHpLNnc/edit
3. https://www.ijirset.com/upload/2015/march/43_A_COMPARATIVE.pdf
4. http://airccse.org/journal/ijcis/ijcisleaflet.pdf
5. http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRO7kjOasUj1lin1v_dK-KbzKa2DvORf95P_mMwhs8pOqinTDauGH9wz6GFBPImIE6A

Course Outcomes:
At the end of the course, students will be able to
1. **Analyze** various security service mechanisms.
2. **Compare** and contrast symmetric and asymmetric encryption systems and their vulnerability to various attacks.
3. **Apply** cryptographic techniques in real time applications
4. **Formulate** web security services and mechanisms.
5. **Distinguish** SSL, TLS and its applications.

COs	**CO- PO, PSO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak			
	\multicolumn{12}{c	}{**Programme Outcomes(POs)**}	\multicolumn{3}{c	}{**PSOs**}		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3			2				2					2
CO2		3		2				2						2	
CO3	3			3			2			2			3		
CO4													2		
CO5		3		2				2						2	

Professional Elective - VI

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VIII Semester	
Code: 80620	CYBER SECURITY [Professional Elective - VI]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course makes the students to understand the basic concepts security policies, interpret security objectives, various catalog approaches, analyze cyber user, conflict, management, infrastructure issues, investigate various case studies on cyber security policies.

MODULE I: Policies and Security Evolution   **[10 Periods]**
Introduction - Cyber Security, Cyber Security policy, Domain of Cyber Security Policy, Laws and Regulations
Cyber Security Evolution - Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus, Policy, Cyber Security Evolution, Productivity, Internet, E-Commerce, Counter Measures, Challenges.

MODULE II: Cyber Security Objectives and Guidance   **[10 Periods]**
Security Objectives - Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices, Security Policy Objectives, Guidance for Decision Makers, Tone at the Top, Policy as a Project.
Catalog Approach - Cyber Security Management, Arriving at Goals, Cyber Security Documentation, the Catalog Approach, Catalog Format, Cyber Security Policy Taxonomy

MODULE III: Policy Catalog and Issues   **[10 Periods]**
A: Cyber Security Policy Catalog - Cyber Governance Issues, Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging, Cyber User Issues, Malvertising, Impersonation.
B: Cyber user and conflict Issues - Appropriate Use, Cyber Crime, Geo location, Privacy, Cyber Conflict Issues, Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

MODULE IV: Cyber Management and Infrastructures Issues   **[09 Periods]**
Cyber Management Issues - Fiduciary Responsibility – Risk Management – Professional Certification – Supply Chain – Security
Cyber Infrastructure Issues - Principles – Research and Development – Cyber Infrastructure Issue – Banking and finance – Health care – Industrial Control systems.

MODULE V: Case Study   **[09 Periods]**
Government's Approach to Cyber Security Policy - Cyber security strategy-Brief history-Public policy development in the U.S Federal Government.
Espionage - The rise of cyber crime- Espionage and Nation-state Actions-Policy response to growing Espionage threats-Congressional Action.

TEXT BOOKS:
1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs , Jeffrey Schmidt, Joseph Weiss   "**Cyber Security Policy Guidebook**" John Wiley & Sons 2012.
2. Rick Howard "**Cyber Security Essentials**" Auerbach Publications 2011.

REFERENCES:
1. Richard A. Clarke, Robert Knake "**Cyberwar: The Next Threat to National Security & What to Do About It**" Ecco 2010
2. Dan Shoemaker "**Cyber security The Essential Body Of Knowledge**", 1st edition, Cengage Learning 2011.

E-RESOURCES:
1. http://www.esoln.net/edownload/Download/Cyber_Security_Policy_Guidebook.pdf
2. http://index-of.es/Hack/CyberSecuity.pdf
3. https://www.acm.org/education/TowardCurricularGuidelinesCybersec.pdf
4. https://www.cs.cmu.edu/~hovy/papers/14dgo-cybersecurity-taxonomy.pdf
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY77N9KJP4BJuXxkVQSJo9fLOOf1gtbY8enNTX_Gat1aW0f-JrSQu1YTNmVwRFJ_mJ7Q
6. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY737OFS2a5kP6Ph6KB9KG9RiRGN-S5LJoIuO6-Z-TBERz0mAxCmQX4GTFW2WfvuCVAg

Course Outcomes:
At the end of the course, students will be able to
1. **Explore** various security policies and evolution of security.
2. **Investigate** more on various catalog approaches and cyber security objectives.
3. **Analyze** cyber user and conflict issues.
4. **Review** cyber management and infrastructure issues.
5. **Examine** various case studies on cyber security policies.

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**																
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2									2	3		
CO2			3	2										2	
CO3		3	3			3						2	3		
CO4		2	3		3								2		
CO5		2				3								3	

Prerequisites: Computer Networks

Course Objectives:

This course provides the students to gain knowledge in the cloud computing environment, security architecture and development of cloud services. Students will also examine the collaboration of real time cloud services and analyze the case studies from various cloud development tools.

MODULE I: Introduction to Cloud Computing   [8 Periods]

Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

MODULE II: Virtualization   [12 Periods]

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products- VMware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

MODULE III: Cloud Computing Architecture over Virtualized Data Centers

[8 Periods]

A: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds.

B: Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

MODULE IV: Cloud Security   [8 Periods]

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Crypt Db:Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

MODULE V: Cloud Programming and Standards   [12 Periods]

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

TEXT BOOKS:

1. John W. Rittinghouse, "**Cloud Computing: Implementation, Management, and Security** ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "**Distributed and Cloud Computing From Parallel Processing to the Internet of Things**", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," **Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing),** Wiley Publishing ©2011

REFERENCES:
1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "**CryptDB: Protecting Confidentiality with encrypted Query Processing**"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. Craig Gentry,"**A Fully Homomorhic Encryption Scheme**", September 2009.
3. David Marshall, Wade A. Reynolds, "**Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center**", Auerbach Publications, 2006.

E-RESOURCES:
1 http://www.motc.gov.qa/sites/default/files/cloud_computing_ebook.pdf
2 https://www.thesisscientist.com/docs/Study%20Notes/8ad50655-64f5-46d4-bc89-0c02feaf132f
3 http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-5ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA
4 http://www.springer.com/computer/communication+networks/journal/13677
5 http://nptel.ac.in/courses/106106129/28

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** the cloud enabling technologies and the Cloud service models.
2. **Choose** the levels of virtualization and tools for resource provisioning.
3. **Compare** the cloud platform architectures of virtualized data centers and Inter-cloud Resource Management.
4. **Analyze** the principles of Security and Trust management to protect confidentiality of data in the Cloud.
5. **Propose** the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.

CO- PO,PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1				2								1		
CO2		1		2	2							1		1	
CO3		1			3							2		1	
CO4	1											2			1
CO5	1			2								1		1	2

Prerequisites: NIL

Course Objectives:
Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project. Compare and differentiate organization structures and project structures. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

MODULE I [09 Periods]
Software Process Maturity: Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.
Process Reference Models: Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP.

MODULE II [09 Periods]
Software Project Management Renaissance: Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts: Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

MODULE III [10 Periods]
A: Workflows and Checkpoints of process: Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.
B: Process Planning: Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

MODULE IV [10 Periods]
Project Organizations: Line-of-business organizations, project organizations, evolution of organizations, process automation.
Project Control and process instrumentation: The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

MODULE V [10 Periods]
CCPDS-R Case Study and Future Software Project Management Practices: Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:
1. Managing the Software Process, Watts S. Humphrey, Pearson Education.
2. Software Project Management, Walker Royce, Pearson Education.

REFERENCES:
1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth
2. Edition, Wiley India, rp2011.
3. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education,2000

Course Outcomes:

At the end of the course, students should be able to
1. Apply software framework, process, and models in development.
2. Implements the Life cycle process and models in production stages and improve software by economics and management.
3. Planning and scheduling the process with cost estimation and Analyze work flow in process at major milestones by periodic assessment
4. Use of projects in organizations in line of business with process automations and project control with quality metrics.
5. Analyze next generation software with case study applications.

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2				3	2	3	3	3	3	2
CO2	3	3	3	3	2				3	2	2	2	3	3	2
CO3	3	3	3	3	2							2	3	3	2
CO4	3	3	3	3	2							2	3	3	2
CO5	3	3	3	3	2							2	3	3	2

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code:		**L**	**T**	**P**
Credits: 3	**Open Elective-III**	3	-	-

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80P03	Seminar	L	T	P
Credits: 1		-	-	2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80P04	**Project Stage II**	L	T	P
Credits: 10		-	-	20

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80139	ENVIRONMENTAL IMPACT ASSESSMENT AND LIFE CYCLE ANALYSIS [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Environmental Sciences

Course Objectives: The main objective of this course is to provide in-depth knowledge about various methodologies in assessing the environmental impact of various developmental projects. It also provides the knowledge to design a more publicly acceptable project which helps in achieving sustainable development.

MODULE I [10 Periods]

Concept of EIA: Significance of EIA, Factors affecting EIA, Classification of Environmental Parameters, Elements of EIA: Initial Environmental Examination, Preparation of Environmental Base map, Impact Evaluation and Analysis, Environmental Impact Statement (EIS) and Environmental Management Plan (EMP), List of Projects which require EIA.

EIA Methodologies: General methodology of EIA with flow chart, EIA Methods: Ad-hoc methods, Matrix methods, Network methods, Environmental Media Quality Index method, Overlay methods, Cost/Benefit Analysis.

MODULE II [10 Periods]

EIA of Soil: Methodology for the assessment of developmental activities on Soil: Delineation of study area, Identification of impacts, Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures, Environmental impacts of Deforestation: Causes, Effects and Mitigation measures.

EIA of Ground water: Ground water quantity and quality impacts, Systematic method for evaluation of various developmental activities on Ground water environment.

EIA of Surface water: Introduction, Projects which create concerns, Methodology for the assessment of Impacts on surface water environment.

MODULE III

A: EIA of Air and Noise environment: [10 Periods]

Air Pollution sources, Generalized approach for assessment of air pollution impact, Effects of Noise on people and their physiological responses, systematic methodology for assessing environmental impacts of noise

B: EIA of Biological Environment

Introduction to Biodiversity and Systematic approach for evaluating Biological impacts. Assessment of impacts of developmental activities on Vegetation and Wild life.

MODULE IV [09 Periods]

Environmental Legislation: Legislation policies, Environmental Protection Act, Water Act, Water Cess Act, The Air (Prevention & Control of pollution) Act, Motor Act, Wild life Act.

Environmental Audit: Objectives, Advantages, Types of environmental Audit, Audit protocol, Stages of Environmental Audit: Pre-audit activities, Onsite activities and Post audit activities.

MODULE V   **[09 Periods]**

Life Cycle Assessment: Definition, Scope, Methodology, its applications and drawbacks.

Case studies: Preparation of EIA for developmental activities: Industrial projects, Land clearing projects, River valley projects, Construction projects, Highways and Road projects.

TEXT BOOKS:
1. Y. Anjaneyulu, **"Environmental Impact Assessment Methodologies",** BS Publications, CRC Press, 2nd edition, 2011.
2. R.R. Barthwal **"Environmental Impact Assessment",** New Age International Publishers, 2nd edition, 2012.

REFERENCES:
1. M. Anji Reddy, **"Environmental Impact Assessment: Theory and Practice",** BS Publications 1st edition, 2016.
2. Canter, **"Environmental Impact Assessment",** India edition, 1st edition, 2015.
3. N. S. Raman, A.R. Gajbhiye, S.R. Khandeshwar **"Environmental Impact Assessment",** I.K. International Publishing House, Kindle edition, 2014.

E RESOURCES:
1. https://en.wikipedia.org/wiki/Environmental_audit
2. https://fenix.tecnico.ulisboa.pt/downloadFile/3779577342892/5.%20EIA%20methodologies.pdf
3. https://www.dlsweb.rmit.edu.au/conenv/envi1128/Reading-CSTI.pdf

Course Outcomes:
At the end of the course, students will be able to
1. Understand the significance of EIA and the methodologies used for assessing the environmental impacts of developmental projects.
2. Identify, predict and assess the impacts of projects on soil, ground water and surface water environment.
3. Identify a systematic methodology for assessing environmental impacts of projects on air, noise and biological environment.
4. Gain knowledge on various Environmental legislations, policies and Acts.
5. Acquire knowledge on environmental audit, procedure and preparation of audit report.

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	3		3	3	3	2	2		
CO2			2	3		2	1	3	3	2		
CO3			3	2	3	2	2	1	3	2		
CO4							3	2	3	3		
CO5							3	3	2	3		

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80148	**GREEN BUILDINGS** **[OPEN ELECTIVE]**	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
The purpose of the course is provide an overview of emerging delivery systems for high performance green buildings and the basis on which their sustainability can be evaluated.

MODULE I [09 Periods]
Introduction to green buildings, green materials, sources of green materials, high-performance green buildings Impacts of building construction, operation, and disposal Methods and tools for building assessment, Green Globes

MODULE II [10 Periods]
The green building process, Design and construction relationships, benefits of green building quality, healthy and safe environments , Site and landscape strategies.

MODULE III [10 Periods]
A: Building energy system strategies, Water cycle strategies, Materials selection strategies, Indoor Environmental Quality [IEQ]
B: Analysis and strategies, Construction, team responsibilities and controls, Building commissioning strategies

MODULE IV [09 Periods]
Economic issues and analysis, Use of the Green Strategies cost estimating tool, Future directions in green, high performance building technologies

MODULE V [10 Periods]
Carbon accounting Green Building Specification, Case Study on green buildings, Net Zero Energy Buildings, Sustainable Constructions in civil Engineering.

TEXT BOOKS:
1. Abe Kruger and Carl,"**Green Building, Principles and Practices in Residential Construction**", In 2012, Seville Publication.
2. Ross Spiegel, Dru Meadows, "**Green Building Materials: A Guide to Product Selection and Specification**", 3rd Edition,October 2010

REFERENCES:
1. Charles J. Kibert,"**Sustainable Construction: Green Building Design and Delivery Hardcover – Import**", 16 Nov 2012

E-RESOURCES:
1. http://www.ncrec.gov/Pdfs/bicar/GreenBuilding.pdf

Course Outcomes:

At the end of the course, students will be able to

1. Identify green Building Materials and their Sources.
2. Understand the construction process of green buildings and their benefits quality, healthy and safe environments
3. Learn the strategies to construct green buildings.
4. Identify the issues a raised due to construction of green buildings
5. Gain knowledge on the case studies of green buildings.

<table>
<tr><th colspan="13">CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><td rowspan="2">COs</td><th colspan="12">Programme Outcomes(POs)</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th></tr>
<tr><td>CO1</td><td></td><td>3</td><td>2</td><td>1</td><td>2</td><td></td><td>3</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>CO2</td><td></td><td>1</td><td>2</td><td></td><td></td><td>2</td><td>3</td><td></td><td></td><td>1</td><td></td><td>1</td></tr>
<tr><td>CO3</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td>1</td></tr>
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<tr><td>CO5</td><td></td><td></td><td>1</td><td></td><td></td><td>1</td><td>1</td><td></td><td>1</td><td>2</td><td>1</td><td>1</td></tr>
</table>

Prerequisites: NIL

Course Objectives: This course provides the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences along with International Strategy for Disaster Reduction. It also has the potential to make the student design and implement disaster mitigation measures.

MODULE I: Concept of Hazards and Disasters [10 Periods]

Environmental Hazards & Disasters Concept of Environmental Hazards, Environmental Stress & Environmental Disasters. Different Approaches & relation with human Ecology – Landscape, Ecosystem and Perception Approach - Human Ecology & its application in geographical researches.

Types of Environmental Hazards & Disasters Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra-Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards.

MODULE II: Classification of Hazards [10 Periods]

Endogenous Hazards Volcanoes: Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes – Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions. Earthquake Hazards/ Disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake. Landslides: causes and impacts. Avalanches -causes and impacts.

Exogenous Hazards Infrequent events: Cyclones – Lightning – Hailstorms, Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation), Cumulative atmospheric hazards/ disasters : Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards in India- Flood control measures [Human adjustment, perception & mitigation], Droughts: Impacts of droughts- Drought hazards in India- Drought control measures, Extra Planetary Hazards/ Disasters-Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion: Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion- Sedimentation processes, Sedimentation processes: Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation, Biological hazards/ disasters: Population Explosion.

MODULE III: Approaches and Measures in Disaster Management[10 Periods]

A: Emerging Approaches Three Stages: Pre-disaster stage (preparedness), Emergency Stage, Post Disaster stage (Rehabilitation).

B: Natural Disaster Reduction & Management Provision of Immediate relief measures to disaster affected people, Prediction of Hazards & Disasters, Measures of adjustment to natural hazards

MODULE IV: Disaster Management   [09 Periods]

An integrated approach for disaster preparedness, mitigation & awareness. Mitigation- Institutions- discuss the work of following Institution.

a. Meteorological Observatory
b. Seismological Observatory
c. Volcano logical Institution
d. Hydrology Laboratory
e. Industrial Safety Inspectorate
f. Institution of Urban & Regional Planners
g. Chambers of Architects
h. Engineering Council
i. National Standards Committee

Integrated Planning- Contingency Management Preparedness –

a] Education on disasters
b] Community involvement
c] The adjustment of Human Population to Natural Hazards & Disasters Role of Media

Monitoring Management- Discuss the programme of disaster research & mitigation of

disaster of following organizations.

a] International Council for Scientific Unions [ICSU]- Scientific Committee on Problems of
   the Environment [SCOPE], International Geosphere- Biosphere programme [IGBP]
b] World Federation of Engineering Organizations [WFED]
c] National Academy of Sciences
d] World Meteorological Organizations [WMO]
e] Geographical Information System [GIS]
f] International Association of Seismology & Physics of Earth's Interior [IASPEI]
g] Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

MODULE V: Disaster Management in India   [09 Periods]

A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India
Ecological planning for sustainability & sustainable development in India- Sustainable rural development: A Remedy to Disasters-Role of Panchayats in Disaster mitigations **C:** Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & Training.

TEXT BOOKS:
1. Jagbir Singh, "Disaster Management–Future Challenges and Opportunities", I.K.International Publishing House, 1st Edition, 2005.

2. Coppala P Damon, "Introduction to International Disaster Management", ABD Publishers, 2007.

REFERENCES:
1. R.B.Singh [Ed], "Environmental Geography", Heritage Publishers, New Delhi, 1st Edition,1990.
2. Kates,B.I & White. G.F, "The Environment as Hazards", oxford publishers, 5th Edition, New York, 1978.
3. R.B. Singh [Ed] - Disaster Management, Rawat Publication, New Delhi, 1st Edition, 2000.

E RESOURCES:
1. http://www.wcpt.org/disaster-management/what-is-disaster-management.
2. http://study.com/academy/lesson/what-are-cyclones-types-causes-effects.html.

Course Outcomes:
At the end of the course, students will be able to
1. Analyze, evaluate and manage the environmental, social, cultural, economical, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
2. Assess the different public health aspects at local and global levels as a result of Disaster and can plan well to mitigate them.
3. Gain knowledge in various emerging approaches and measure in disaster management.
4. Understand the role of disaster management through Meteorological Observatory, Seismological Observatory, Volcanological Institution, etc.,
5. Acquire the information about Disaster Management, Ecological planning and sustainable development and Environmental policies, Disaster Reduction programs in India.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2				2	3	2	3	2	2	
CO2	3	2				2	3	2	3	2	2	
CO3	3	2				2	3	2	3	2	2	
CO4	3	2				2	3	2	3	2	2	
CO5	3	2				2	3	2	3	2	2	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80234	ELECTRICAL ENERGY CONSERVATION AND AUDITING [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course deals about the concept of energy conservation, energy management and different approaches of energy conservation in industries, economic aspects of energy conservation project and energy audit in commercial and industrial sector.

MODULE I   Basic Principles of Energy Audit   [9 Periods]

Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy audit of industries - Energy saving potential, energy audit of process industry, thermal power station, building energy audit.

MODULE II Energy Management   [9 Periods]

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

MODULE III Energy Efficient Motors   [10 Periods]

A: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details.
B: Characteristics - Variable speed, variable duty cycle systems, RMS hp - Voltage variation -Voltage unbalance - Over motoring - Motor energy audit.

MODULE IV Power Factor Improvement, Lighting & Energy Instruments

[10 Periods]

Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit.
Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers , application of PLC's.

MODULE V Economic Aspects and Analysis   [10 Periods]

Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS:
1. W.R. Murphy and G. Mckay, "Energy Management", Butter Worth Publications.

2. John. C. Andreas, "Energy Efficient Electric Motors", Marcel Dekker Inc Ltd, 2nd Edition, 1995.

REFERENCES:

1. Paul O' Callaghan, "Energy Management", Mc-Graw Hill Book Company, 1st Edition, 1998.
2. W.C.Turner, "Energy Management Hand Book", A John Wiley and Sons.
3. S. C. Tripathy, "Utilization of Electrical Energy", Tata McGraw Hill, 1993.
4. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
5. L.C. Witte, P.S. Schmidt and D.R.Brown, "Industrial Energy Management and Utilization", Hemisphere Publication, Washington, 1998.

E - RESOURCES:
1. http://industrialelectricalco.com/wp-content/uploads/2014/01/Understanding-Energy-Efficient-Motors-EASA.pdf
2. https://beeindia.gov.in/
3. https://beeindia.gov.in/sites/default/files/3Ch10.pdf

Course Outcomes:
At the end of the course, students will be able to
1. Examine the principles of Energy audit and its process in thermal power station, industries.
2. Analyze the different aspects of energy management.
3. Describe the characteristics of energy efficient motors.
4. Illustrate the power factor improvement, good lighting system practice and the types of energy instruments
5. Analyze the economic aspects of Energy Management.

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

<table>
<tr><td colspan="13" align="center">CO- PO Mapping
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<tr><td rowspan="2">COs</td><td colspan="12" align="center">Programme Outcomes(POs)</td></tr>
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<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO5</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
</table>

Prerequisites: NIL

Course Objectives:

This course deals with the general safety requirements during the electrical installations. The course emphasis on the various objectives of energy management and auditing.

MODULE I   RULES & REGULATIONS   [10 Periods]

Power sector organization and their roles – significance of IE rules & IE acts – general safety requirements: Span conductor configuration, spacing and clearing, sag, erection, hazards of electricity.

MODULE II INSTALLATION AND EARTHING OF EQUIPMENTS
[10 Periods]

Classification of electrical installation - earthing of equipment bodies – electrical layout of switching devices and SC protection – safety in use of domestic appliances – safety documentation and work permit system – flash hazard calculations – tools and test equipments.

MODULE III SAFETY MANAGEMENT AND FIRST AID   [09 Periods]

A: Safety aspects during commissioning – safety clearance notice before energizing – safety during maintenance – maintenance schedule – special tools – security grand– check list for plant security – effects of electric and electromagnetic fields in HV lines and substations.

B: Safety policy in management & organizations – economic aspects – safety program structure – elements of good training program – first aid – basic principles – action taken after electrical shock – artificial respiration and methods – chocking – poisoning.

MODULE IV FIRE EXTINGUISHERS   [10 Periods]

Fundamentals of fire – initiation of fires – types – extinguishing – techniques – prevention of fire – types of fire extinguishers- fire detection and alarm system – CO2 and Halogen gas schemes, foam schemes.

MODULE V ENERGY MANAGEMENT & ENERGY AUDITING [09 Periods]

Objectives of energy management – energy efficient electrical systems – energy conservation and energy policy – renewable source of energy – energy auditing – types and tips for improvement in industry.

TEXT BOOKS:
1. John Codick, "Electrical safety hand book", McGraw Hill Inc, New Delhi, 2000.
2. V. Manoilov, "Fundamentals of electrical safety", Mir Publishers, MOSCOW, 1975.

REFERENCES:
1. C.S. Raju, "A Practical Book on domestic safety", Sri Sai Publisher, Chennai, 2003.
2. Power Engineering Hand book, TNEB Engineers officers, Chennai, 2002.
3. S. Rao, R.C. Khanna, "Electrical safety, Fire safety engineering and safety management", Khanna Publisher, Delhi, 1998.
4. The Indian electricity rules, 1956, authority regulations, 1979, Commercial Law Publication, Delhi, 1999.
5. W.F.Cooper, "Electrical safety Engineering", Newnes-Butterworth company, 1978.

E- RESOURCES:
1. http://nptel.ac.in/courses/103106071/5
2. https://beeindia.gov.in/
3. https://www.electrical4u.com/equipment-earthing/
4. https://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html

Course Outcomes:
At the end of the course, students will be able to
1. Gain basic knowledge on Indian Power sector organization and their roles.
2. Understand the concepts of earthing and its standards.
3. Acquire the basic knowledge on First aid and safety during electrical installation..
4. Distinguish various fire extinguishers and their classification.
5. Understand the basic concepts of energy auditing.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
COs	Programme Outcomes(POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3								3
CO2	3	3	3	3								3
CO3	3	3	3	3								3
CO4	3	3	3	3								3
CO5	3	3	3	3								3

Prerequisites: NIL

Course Objectives: This course deals with the need for electrical energy storage, different electrical storage technologies, types and features of energy storage systems and the applications of electrical energy storage.

MODULE I: ELECTRICAL ENERGY STORAGE TECHNOLOGIES
[10 Periods]

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

MODULE II: NEEDS FOR ELECTRICAL ENERGY STORAGE [10 Periods]

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses. The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

MODULE III: FEATURES OF ENERGY STORAGE SYSTEMS [10 Periods]

A: Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES).
B: Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

MODULE IV: TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS
[09 Periods]

Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

MODULE V APPLICATIONS   [09 Periods]

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

TEXT BOOKS:
1. James M. Eyer, Joseph J. Iannucci and Garth P. Corey, "Energy Storage Benefits and Market Analysis".

2. The Electrical Energy Storage" by IEC Market Strategy Board.

REFERENCES:
1. Jim Eyer, Garth Corey, "Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report", Sandia National Laboratories, Feb 2010.

E - RESOURCES:
1. http://nptel.ac.in/courses/108105058/
2. http://www.nptel.ac.in/courses/108103009/pdf/lec33.pdf

Course outcomes:
At the end of the course, students will be able to
1. Understand the different types of electrical energy storage technologies.
2. Learn about the need for electrical energy storage.
3. Comprehend the various features energy storage systems.
4. Understand the various types of electrical energy storage systems.
5. Emphasize the various applications of electrical energy storage.

<table>
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<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
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<tr><td>CO5</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
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2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.		
Code: 80352	TOTAL QUALITY MANAGEMENT [OPEN ELECTIVE]		L	T	P
Credits: 3			3	-	-

Prerequisites: Nil

Course Objectives:
To give the students an overview of quality and TQM and explaining the salient contributions of Quality Gurus like Deming, Juran and Crosby and general barriers in implementing TQM and also get basic knowledge about ISO.

MODULE I: Introduction   [10 Periods]
Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

MODULE II: TQM Principles   [10 Periods]
Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

MODULE III: Statistical Process Control (SPC)   [10 Periods]
A: Statistical fundamentals – Measures of central Tendency and Dispersion - Population and Sample.
B: Control Charts for variables and attributes, Industrial Examples. Process capability. Concept of six sigma – New seven Management tools.

MODULE IV: TQM Tools   [09 Periods]
Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Types. Quality Function Deployment (QFD) - House of Quality - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures

MODULE V: Quality Systems   [09 Periods]
Need for ISO 9000 and Other Quality Systems - ISO 9000-2008 Quality System - Elements, Implementation of Quality System Documentation, Quality Auditing - QS 9000 - ISO 14000 - ISO 18000, ISO 20000, ISO 22000 TS 16949, ISO 14000, AS9100– Concept, Requirements and
benefits – case studies.

TEXT BOOKS:
1. Dale H. Besterfiled, "**Total Quality Management**", 3rd, Pearson Education Asia, Indian Reprint, 2010.
2. Subburaj Ramasamy" **Total Quality Management**" Tata McGraw - Hill publishers, 2012.

REFERENCES:
1. Suganthi.L and Anand Samuel, "**Total Quality Management**", Prentice Hall (India) Pvt. Ltd., 2011.
2. James R. Evans and William M. Lindsay, "**The Management and Control of Quality**", 8th Edition, Cengage Learning, 2012.
3. Janakiraman. B and Gopal .R.K., "**Total Quality Management - Text and Cases**", Prentice Hall (India) Pvt. Ltd., 2006.
4. Dr S. Kumar, "**Total Quality Management**", Laxmi Publications Ltd., New Delhi 2015.
5. P. N. Muherjee, "**Total Quality Management**", Prentice Hall of India, New Delhi, 2006.
6. Poornima M. Charantimath "**Total Quality Management**" Pearson publications, 2011.

E - RESOURCES:
1. https://src.alionscience.com/pdf/RAC-1ST/SOAR7_1st_Chapter.pdf
2. https://onlinecourses.nptel.ac.in/noc17_mg18
3. nptel.ac.in/courses/122106032/Pdf/4_2.pdf
4. www.thecqi.org
5. www.emeraldinsight.com/journal/tqm
6. www.emeraldinsight.com/doi/pdf/10.1108/09544789710367712
7. www.statit.com/statitcustomqc/StatitCustomQC_Overview.pdf

Course outcomes:
At the end of the course, students will be able to
1. Gain basic knowledge in total quality management relevant to both manufacturing and service industry.
2. Implement the basic principles of TQM in manufacturing and service based organization.
3. Apply various SPC tools in real time manufacturing and service industry.
4. Implement various TQM tools like FMEA & QFD.
5. Apply various ISO Standards for real time applications.

	CO- PO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**											
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1				3	2			3		3	3
CO2	1				3	2			3		3	3
CO3	1				3	2			3		3	3
CO4	1				3	2			3		3	3
CO5	1				3	2			3		3	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.		
Code: 80356	INDUSTRIAL SAFETY [OPEN ELECTIVE]		L	T	P
Credits: 3			3	-	-

Prerequisites: Nil

Course Objectives:
The purpose of this course is to teach the concept of Industrial Safety & provide useful practical knowledge for workplace safety which helps identification, evaluation and control of all the hazards and potential hazards to prevent or mitigate harm or damage to people, property or the environment.

MODULE I: Introduction   [10 Periods]
Definition-Development before industrial revolution-Milestones in industrial safety movement Development of accident prevention programs-3 E's of safety-Development of Safety organizations-Safety and health movement- Managing emergency in industries.

MODULE II: Accident Prevention   [10 Periods]
Safety and productivity-Fallacies about safety-Industrial psychology in accident prevention Basic philosophy of accident prevention-Unsafe condition, Unsafe act, Injury, Fault of persons Cost of accidents- Safety education.

MODULE III: Safety Organization & Industrial Hygiene   [10 Periods]
**   and Hazards**
A: Purpose of a safety organization-Safety policy- Safety committee- types- Role of safety coordinator- Responsibilities, Interferences and Sufferings of safety supervisor-Safety publicity-Accident reporting-Accident investigation-Accident statistics-Safety audits.
B: OSHA and industrial hygiene-work site analysis-recognizing and controlling hazards Occupational diseases prevention-Employee welfare-Statutory welfare schemes, Non statutory schemes-Health hazards-Control strategies- Fire hazards and prevention, Electrical hazard prevention and safety.

MODULE IV: Industrial Process Safety   [09 Periods]
Overview-Safety performance by industry sector-Incident pyramid-Process hazard and risk. Failure of defenses - Process safety management-Scope, Functions, Features and Characteristics. Role of organizational levels in Process safety Management-Assessing organizations safety effectiveness.

MODULE V: Human Side of Safety   [09 Periods]
Management of change-Process and equipment integrity-Human behavior aspects and modes-The Swiss cheese model of industrial accidents-Active and Latent failures-examples - Safety lessons Human Factors influencing the likelihood of failure-Organizational culture, Demographic effects.

TEXT BOOKS:
1   Krishnan N.V., **"Safety in Industry",** Jaico Publisher House, 2005.
2   Singh, U.K. and Dewan, J.M., "**Safety, Security and risk management",** APH Publishing Company, New Delhi, 2005.

REFERENCES:
1   C. Ray Asfahl, David W. Rieske " **Industrial Safety and health management",** Prentice Hall,2009.
2   R.K. Mishra, **"Safety Management"**, AITBS publishers, 2012.
3   Krishnan N.V., "**Safety in Industry**", Jaico Publisher House, 2005
4   Singh, U.K. and Dewan, J.M., "**Safety, Security and risk management**", APH Publishing Company, New Delhi, 2005.
5   C.Ray Asfahl, David W. RieskE, " **Industrial Safety and health management**", Prentice Hall,2009.

E -RESOURCES:
1   https://issuu.com/stmjournalspublication/docs/journal_of_industrial_safety_engine
2   http://www.nsc.org.in/index.php?option=com_content&view=article&id=15&Itemid=99
3   http://www.mdpi.com/journal/safety
4   http://www.sciencedirect.com/science/journal/09219110?sdc=1

Course outcomes:
At the end of the course, students will be able to
1.   Identify the evaluation of industrial safety and health standards.
2.   Analyze the philosophies behind industrial accidents.
3.   Apply the hierarchical levels in a safety organization and apply the types of industrial hazards and preventive measures.
4.   Implement the concept of industrial process safety.
5.   Apply the safety procedures for human.

COs	**CO- PO Mapping** **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**

COs	**Programme Outcomes(POs)**
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		2			3	3			2		3
CO2	1		2			3	3			2		3
CO3	1		2			3	3			2		3
CO4	1		2			3	3			2		3
CO5	1		2			3	3			2		3

Prerequisites: Nil

Course Objectives:
The objective of this subject is to provide knowledge about different non-conventional energy sources.

MODULE I: Principles of Solar Radiation   [10 Periods]
Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

MODULE II: Solar Energy   [10 Periods]
Solar Collectors: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

MODULE III: Wind Energy & Bio-Mass   [10 Periods]
A: Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.
B: Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

MODULE IV: Geothermal Energy & Ocean Energy   [09 Periods]
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants and their economics.

MODULE V: Direct Energy Conversion   [09 Periods]
Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, merit, materials, applications. MHD generators - principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems. Electron gas dynamic conversion - economic aspects. Fuel cells - Principles of Faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:
1.G.D. Rai, "Non-Conventional Energy Sources", Khanna publishers, 2011.
2.Tiwari and Ghosal, "Renewable Energy Resources", Narosa Publishing House, 2007.

REFERENCES:
1. Twidell & Weir, "Renewable Energy Sources", Taylor and Francis Group Publishers, 2015.
2. Sukhatme, "Solar Energy", McGraw-Hill-third edition, 2008.
3. B.S Magal Frank Kreith& J.F Kreith "Solar Power Engineering", McGraw-Hill Publications, 2010.
4. Frank Krieth & John F Kreider, "Principles of Solar Energy", McGraw-Hill, 1981.
5. Ashok V Desai, "Non-Conventional Energy", New International (P) Limited, 2003.

E - RESOURCES:
1. nptel.ac.in/courses/112105051/
2. https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
3. faculty.itu.edu.tr/onbasiogl1/DosyaGetir/62002
4. https://www.journals.elsevier.com/renewable-energy/
5. www.ijrer.org

Course Outcomes:
At the end of the course, students will be able to
1. Understand the principles of solar radiation
2. Recognize solar collectors, Solar energy storage and its applications
3. Classify the harvesting of wind energy & bio-mass energy.
4. Understand the harvesting of geothermal energy & ocean energy.
5. Apply the direct energy conversion methods

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
	Programme Outcomes(POs)										
CO1	1					3	3					3
CO2	1					3	3					3
CO3	1					3	3					3
CO4	1					3	3					3
CO5	1					3	3					3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80435	EMBEDDED SYSTEM DESIGN [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Microprocessors and Microcontrollers.
Course Objectives: This course introduces the difference between Embedded Systems and General purpose systems. This course familiarizes to compare different approaches in optimizing General purpose processors. This course provides the design tradeoffs made by different models of embedded systems.

Module-I: Introduction to Embedded Systems [08 Periods]
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Module - II: Typical Embedded System [12 Periods]
Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

Module - III: Embedded Firmware [10 Periods]
A:Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer.
B: Embedded Firmware Design Approaches and Development Languages.

Module - IV: RTOS Based Embedded System Design [09 Periods]
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Module - V: Task Communication [09 Periods]
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:
1. Shibu K. V, **"Introduction to Embedded Systems"**, McGraw Hill, 2013.
2. Raj Kamal, **"Embedded Systems"**, TMH.

REFERENCES:
1. Frank Vahid, Tony Givargis, John Wiley,**"Embedded System Design"**.
2. Lyla**, "Embedded Systems"**, Pearson, 2013.
3. David E. Simon, **"An Embedded Software Primer"**, Pearson Education.

E-RESOURCES:

1. https://searchworks.stanford.edu/view/10473232
2. https://www.researchgate.net/.../228619090_Resource_Management_for_Embedded_Sy...
3. https://electronicsforu.com › Resources › Learning Corner
4. https://nptel.ac.in/courses/108102045/
5. nptel.ac.in/courses/.../IIT%20Kharagpur/Embedded%20systems/New_index1.html

Course Outcomes:

At the end of the course students are able to:

1. Understand the basics of an embedded system.
2. Design, implement and test an embedded system.
3. Understand the design tradeoffs made by different models of embedded systems.
4. Know types of operating systems
5. Learn how to choose RTOS

	CO- PO Mapping											
	(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	1			1						
CO2	2		2	1		1	1					1
CO3	2		3	1	1	2	1				1	1
CO4	1		3	1	1	2	1					1
CO5	1		2	1	1	1						1

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80446	PRINCIPLES OF COMMUNICATION ENGINEERING [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
To study different modulation techniques used in analog communications and digital communications. To also introduce basics of satellite and optical communications.

MODULE I: Fundamentals of Analog Communication   [10 Periods]
Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

MODULE II: Band-pass Modulation Techniques   [10Periods]
Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costasloop, DPSK.

MODULE III: Base Band Transmission Techniques   [10 Periods]
A: Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization
noise rate, companding – analog and digital – percentage error,
B: delta modulation, adaptive delta modulation, differential pulse code modulation, pulse
transmission – Intersymbol interference, eye patterns.

MODULE IV: Spread Spectrum and Multiple Access Techniques   [09 Periods]
Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

MODULE V: Satellite and Optical Communication   [09 Periods]
Satellite Communication Systems-Keplers Law,LEO and GEO Orbits, footprint, Link model Optical Communication Systems-Elements of Optical Fiber Transmission link, Types, Losses, Sources and Detectors.

TEXT BOOKS:
1. Wayne Tomasi, ―Advanced Electronic Communication Systems‖, 6th Edition, PearsonEducation, 2007.
2. Simon Haykin, ―Communication Systems‖, 4thEdition, John Wiley &Sons, 2001.

REFERENCES:

1.H.Taub,DL Schilling,G Saha,―Principles of Communication‖, 3rdEdition,2007.

2.B.P.Lathi,―Modern Analog And Digital Communication systems‖, OxfordUniversity Press, 3rd Edition,2007.

3.Blake, ―Electronic Communication Systems‖, Thomson Delmar Publications,2002.

4.Martin S.Roden, ―Analog and Digital Communication System‖, PHI,3rd Edition, 2002.

5.B. Sklar, ―Digital Communication Fundamentals and Applications‖, Pearson Education,2nd Edition, 2007.

E-RESOURCES:

1. https://courses.engr.illinois.edu/ece458/comms2.pdf
2. http://www.ece.lehigh.edu/~jingli/teach/F2005CT/notes/AnalogCommunication.pdf
3. http://nptel.ac.in/courses/117105131/

Course Outcomes:

At the end of the course, students will be able to

1. Understand fundamentals of analog communications
2. Understand different band-pass modulation schemes
3. Understand different base-band modulation schemes
4. Understand spread spectrum techniques and multiple access mechanisms
5. Get basic knowledge on satellite and optical communications

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak
	Programme Outcomes(POs)
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	2		2	1	1	1	3
CO2	3	3	3	3	2	2		2	1	1	1	3
CO3	3	2	2	2	2	1		1	1	1		2
CO4	3	3	3	3	3	2			1		1	2
CO5	3	2	2	2	2	2	2	2	1	1	1	2

Prerequisites: Basic Electrical and Electronics Engineering

Course Objectives:

The course aims to enable the student to visualize IC Fabrication steps and various IC technologies and to understand electrical properties of MOS, CMOS and Bi CMOS circuits.

The focus of the course is also on training the student to draw integrated circuit layouts following design rules. The course also helps the student to understand basic architectures of Data path subsystems, Application Specific Integrated Circuits, of CPLDs and FPGAs.

MODULE-I: IC Technologies & IC Fabrication [10 Periods]

IC Technologies – Review of Enhancement and Depletion MOS transistors, NMOS, PMOS & CMOS fabrications, Comparison of NMOS, CMOS &BiCMOS technologies.

IC Fabrication: Steps in Fabrication-Oxidation, Lithography, Diffusion, Ion implantation, Encapsulation and Metallization.

MODULE-II:Basic Electrical Parameters [10 Periods]

I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage (Vt), transconductance(g_m), output conductance(g_{ds}) & figure of merit.Pass transistor, NMOS Inverter, Determination of pull-up to pull-down ratios, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters, Latch-up in CMOS circuits.

MODULE-III:VLSI Circuit Design Processes [10 Periods]

A: VLSI Design Flow, MOS Layers, Stick Diagrams, Lambda based Design Rules and Layout, 2 µm CMOS Design rules for wires, Contacts and Transistors

B: Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits- Scaling models, Scaling function for device parameters, Limitations of Scaling.

MODULE-IV:Data Path Subsystems [09 Periods]

Data Path Subsystems: Subsystem Design – Barrel Shifter, Carry Select and Carry look Ahead Adder, Serial-Parallel and Braun Array Multiplier.

MODULE-V: ASIC's and PLD's [09 Periods]

Application Specific Integrated Circuits – Channel gate array, Channel less gate array and structured gate array.

Programmable Logic Devices - Architectures of CPLDs and FPGAs.

TEXT BOOKS:

1. Kamran Eshraghian, Douglas A. Pucknell, **"Essentials of VLSI circuits and systems"**, PHI, 1st Edition, 2005.

2. K. Lal Kishore, VSV. Prabhakar, **"VLSI Design"**, I. K international Publishing House Private Ltd, 2009.

REFERENCES:
1. Neil H. E Weste, David Harris, Ayan Banerjee, **"CMOS VLSI Design - A circuits and systems perspective"**, Pearson Education, 3rd Edition, 2009.

E-RESOURCES:
1. https://www.ece.uic.edu/~dutt/courses/ece565/lect-notes.html
2. http://www.egr.msu.edu/classes/ece410/mason/files/Ch2.pdf
3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=92
4. https://www.journals.elsevier.com/integration-the-vlsi-journal/
5. http://nptel.ac.in/courses/117106093/
6. http://nptel.ac.in/courses/117101058/

Course Outcomes:
At the end of the course, students will be able to:
1. Understand the Enhancement and Depletion mode transistors and describe the steps involved in IC fabrication.
2. Understand the electrical properties of MOS and able to describe problem due to CMOS Latch up and the remedies for that.
3. Illustrate circuit diagrams, stick diagrams and layouts for NMOS, CMOS and BiCMOS circuits and the effects of Scaling.
4. Understand Basic architectures of Data path subsystems.
5. Understand Basic architectures of Application Specific Integrated Circuits, of CPLDs and FPGAs.

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	1	2		1					2
CO2	2	2	2	2	1							
CO3	2	1	2	2	1						2	2
CO4	2	1	2	2	2		1				2	2
CO5	2	1	2	2	3		2				3	3

Prerequisites: NIL
Course Objectives:
This course enables the students to learn the basic concepts and the applications of Data Base Systems and conceptualize and depict a Data Base System using ER diagram, masterin constructing queries using SQL. Using this course student can understand relational database principles, become familiar with the basic issues of transaction processing and concurrency control and Data Base storage structures and access techniques.

MODULE I: Introduction: [10 Periods]
Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.
Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.
Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

MODULE II: Relational Algebra and Calculus: [9 Periods]
Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.
SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases.

MODULE III: Schema Refinement and Normal Forms: [10 Periods]
A:Schema Refinement - Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs,
B:Normal Forms- Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

MODULE IV: Transaction Management and Concurrency Control [10 Periods]
Transaction Management:-Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes.
Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems..

MODULE V: Storage and Indexing   **[09 Periods]**
Storage - Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations. Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOKS:
1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition.
2. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited l, 6th edition

REFERENCES:
1. Database Systems, 6th edition, R Elmasri, ShamkantB.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C. J. Date, Pearson Education.

E-RESOURCES:
1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edi tion.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISH NAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+ret ri eval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Course Outcomes:
At the end of the course, students will be able to
1. Identify the basic elements of a relational database management system and the data models for relevant problems.
2. Write SQL Queries by designing entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
3. Analyze various functional dependencies and apply normalization for designing a robust data base in the development of application software.

4. Implement transactions, concurrency control, recovery and Query optimization techniques.
5. Compare various indexing and hashing techniques.

COs	Programme Outcomes(POs)											
CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2			3				2		3
CO2	3	3	3			3				3		3
CO3	3	3	3			2				3		2
CO4	3	2	1			1				1		1
CO5	3	1	1			1						1

PRE-REQUISITES: Databases, Programming fundamentals.
Course Objectives:
This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs, discuss about concepts of big data, make use of Hadoop concepts for designing applications, develop applications using Hadoop I/O and analyze big data using programming tools such as Pig and Hive.

MODULE I: Big data overview, data analytics, and R Language   [09 Periods]
Big Data Overview: Data Structures, Analyst Perspective on Data Repositories, State of the Practice in Analytics, Bl Versus Data Science, Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach to Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics. Data Analytics Lifecycle, Model Building and Basic Data Analytic Methods Using R Data Analytics Lifecycle Overview, Key Roles for a Successful Analytics Project, Background and Overview of Data Analytics Lifecycle - Discovery, Data Preparation, Learning the Business Domain, Model Planning, Model building, Communicate Results, Operationalize and case study example Global Innovation Network and Analysis (GINA)
R Introduction: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation, Hypothesis Testing, Difference of Means, Rank-Sum Test, Errors, Sample Size data

MODULE II: Working with Big Data   [09 Periods]
Hadoop - Google File System, Hadoop Distributed File System (HDFS)– Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker).
Configuring of Hadoop Cluster - Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

MODULE III: Hadoop API and Map Reduce Programs   [09 Periods]
A: Hadoop API - Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New)
B: MapReduce Programs with classes - Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

MODULE IV: Hadoop I/O and Implementation   [09 Periods]
Hadoop I/O - The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections.
Implementation - Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators.

MODULE V: PIG and HIVE HADOOP TOOL   [12 Periods]
PIG - HADOOP TOOL -   Hadoop Programming Made Easier - Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.
HIVE – HADOOP TOOL - Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

TEXT BOOKS:
1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services, Wiley Publishers, 2015.
2. Cay Horstmann, Wiley John Wiley & Sons, "**Big Java**", 4th Edition, INC
3. Tom White, "**Hadoop: The Definitive Guide**" 3rd Edition, O'reilly

REFERENCES:
1. Alex Holmes, "**Hadoop in Practice**", MANNING Publ.
2. Srinath Perera, Thilina Gunarathne, "**Hadoop MapReduce**" Cookbook.

E-RESOURCES:
1. http://newton.uam.mx/xgeorge/uea/Lab_Prog_O_O/materiales_auxiliares/Big_Java_4th_Ed.pdf
2. http://www.isical.ac.in/~acmsc/WBDA2015/slides/hg/Oreilly.Hadoop.The.Definitive.Guide.3rd.Edition.Jan.2012.pdf-
3. https://static.googleusercontent.com/media/research.google.com/en//archive/mapreduce-osdi04.pdf
4. http://www.comp.nus.edu.sg/~ooibc/mapreduce-survey.pdf
5. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/18
6. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/40

 Course Outcomes:
 At the end of the course, students will be able to
  1. Develop simple applications using R language
  2. Analyze file systems such as GFS and HDFS.
  3. Design applications by applying Map reduce concepts.
  4. Build up programs by making use of I/O.
  5. Explore and inspect the big data using programming tools like Pig and Hive.

COs	**CO- PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	3	1		1	3	2	1	3
CO2	3	2	3	3	3						2	1
CO3	3	3	3	3	3							3
CO4	3	3	3	3	3						1	3
CO5	2	3	3	3	3						1	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80535	CLOUD COMPUTING [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks

Course Objectives:

This course provides the students to gain knowledge in the cloud computing environment, security architecture and development of cloud services. Students will also examine the collaboration of real time cloud services and analyze the case studies from various cloud development tools.

MODULE I: Introduction to Cloud Computing   [8 Periods]

Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

MODULE II: Virtualization   [12 Periods]

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products- VMware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

MODULE III: Cloud Computing Architecture over Virtualized Data Centers
[8 Periods]

A: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds.

B: Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

MODULE IV: Cloud Security   [8 Periods]

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Crypt Db: Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

MODULE V: Cloud Programming and Standards   [12 Periods]

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

TEXT BOOKS:

1. John W. Rittinghouse, "**Cloud Computing: Implementation, Management, and Security** ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "**Distributed and Cloud Computing From Parallel Processing to the Internet of Things**", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," **Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing),** Wiley Publishing ©2011

REFERENCES:

1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "**CryptDB: Protecting Confidentiality with encrypted Query Processing**"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. Craig Gentry,"**A Fully Homomorhic Encryption Scheme**", September 2009.
3. David Marshall, Wade A. Reynolds, "**Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center**", Auerbach Publications, 2006.

E-RESOURCES:

1 http://www.motc.gov.qa/sites/default/files/cloud_computing_ebook.pdf
2 https://www.thesisscientist.com/docs/Study%20Notes/8ad50655-64f5-46d4-bc89-0c02feaf132f
3 http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-5ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA
4 http://www.springer.com/computer/communication+networks/journal/13677
5 http://nptel.ac.in/courses/106106129/28

Course Outcomes:

At the end of the course, students will be able to
1. Understand the cloud enabling technologies and the Cloud service models.
2. Choose the levels of virtualization and tools for resource provisioning.
3. Compare the cloud platform architectures of virtualized data centers and Inter-cloud Resource Management.
4. Analyze the principles of Security and Trust management to protect confidentiality of data in the Cloud.
5. Propose the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
COs	**Programme Outcomes(POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1				2							
CO2		1		2	2							1
CO3		1			3							2
CO4	1											2
CO5	1			2								1

Prerequisites: NIL
Course Objectives:
This course aims the students to learn the essentials of mobile apps development, aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.

MODULE I: Mobile and Information Architecture   [10 Periods]
Introduction to Mobile - A brief history of Mobile, The Mobile Eco system, Why Mobile? Types of Mobile Applications.
Mobile Information Architecture - Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

MODULE II: Introduction to Android and Installation   [10 Periods]
Introduction to Android - History of Mobile Software Development, The Open Handset Alliance-Android platform differences.
Android Installation - The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building a Sample Android application.

MODULE III: Android Application Design and Settings   [10 Periods]
A: Android Application Design Essentials - Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.
B: Android File Settings -   Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, working with different types of resources.

MODULE IV: Android UID and Techniques   [09 Periods]
Android User Interface Design -   Essentials User Interface Screen elements, Designing User Interfaces with Layouts.
Animation Techniques - Drawing and Working with Animation- Drawing on the screen –Working with Text-Working with Bitmaps-Working with shapes-Working with animation.

MODULE V: Android APIs-I &   APIs-II   [09 Periods]
Android APIs-I - Using Common Android APIs Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers.
Android APIs-II - Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:
1. James Keogh, **"J2ME: The Complete Reference"**, Tata McGrawHill.

2. Lauren Darcey and Shane Conder, **"Android Wireless Application Development"**, Pearson Education, 2nd ed. (2011).

REFERENCES:
1. Reto Meier, **"Professional Android 2 Application Development"**, Wiley India Pvt Ltd.
2. Mark L Murphy, **"Beginning Android"**, Wiley India Pvt Ltd.
3. Barry Burd, **"Android Application Development All in one"** 1st edition, Wiley India Pvt Ltd.

E-RESOURCES:
1. http://onlinevideolecture.com/ebooks/?subject=Android-Development
2. https://developer.android.com/training/basics/firstapp/index.html
3. IEEE Transactions on Mobile Computing
4. International Journal of Interactive Mobile Technologies
5. http://nptel.ac.in/courses/106106147/

Course Outcomes:
At the end of the course, students will be able to
1. **Classify** different types of Platforms.
2. **Appreciate** the Mobility landscape.
3. **Familiarize** with Mobile apps development aspects.
4. **Design** and **develop** mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
5. **Perform** testing, signing, packaging and distribution of mobile apps.

CO-PO Mapping											
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
COs	Programme Outcomes(POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2			3		3							
CO3			3		3							
CO4				2			1					
CO5							1		3			3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80606	PYTHON PROGRAMMING [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course enables the students to understand the fundamentals of python programming, describe the various operators and control flow statements, analyze various data structures, make use of functions, discuss about MODULE s, packages in python, object oriented concepts, exception handling, illustrate advanced concepts like multithreading, graphics and generate various test cases.

MODULE I: Python Programming-Introduction   [09 Periods]
Introduction- History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL (Shell) Running Python Scripts.
Data Types - Variables, Assignment, Keywords, Input-Output, Indentation-Types - Integers, Strings, Booleans.

MODULE II: Operators and Expressions   [09 Periods]
Operators - Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators.
Expressions - Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue.

MODULE III: Data Structures and Functions   [10 Periods]
A: Data Structures - Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions.
B: Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful, Functions (Function Returning Values) Scope of the Variables in a Function - Global and Local Variables.

MODULE IV: MODULEs, Packages and Exception handling   [10 Periods]
MODULEs - Creating MODULE s, import statement, from. Import statement; name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor, Method, Inheritance, Overriding Methods, Data hiding.
Error and Exceptions - Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

MODULE V: Library functions and testing   [10 Periods]
Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics.

Testing - Why testing is required?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

TEXT BOOKS:
1. Vamsi Kurama, "**Python Programming: A Modern Approach**", Pearson Publications.
2. Mark Lutz," **Learning Python**", Orielly Publishers

REFERENCES:
1. Allen Downey, "**Think Python**", Green Tea Press
2. W. Chun, "**Core Python Programming**", Pearson.
3. Kenneth A. Lambert, "**Introduction to Python**", Cengage

E–RESOURCES
1. http://kvspgtcs.org/wp-content/uploads/2013/08/Python-Programming-for-the-Absolute-Beginner.pdf 2
2. http://www.bogotobogo.com/python/files/pytut/Python%20Essential%20Reference,%20Fourth%20Edition%20(2009).pdf
3. https://periodicals.osu.eu/ictejournal/dokumenty/2015-02/ictejournal-2015-2-article-1.pdf
4. http://ptgmedia.pearsoncmg.com/images/9780132678209/samplepages/0132678209.pdf
5. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv163-Page1.htm

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** the basics of python programming languages
2. **Illustrate** simple programs with control structures
3. **Apply** advanced concepts like data structures and make use of functions.
4. **Develop** simple applications by using MODULE s, packages and exception handling mechanisms.
5. **Demonstrate** projects that make use of libraries and generate test cases for the projects.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1			1	1							
CO2		1	1	3								-
CO3	1	1	1	1	2							1
CO4											1	1
CO5						1						1

Prerequisites: Discrete Mathematics
Course Objectives:
This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques

MODULE I: Introduction [10 Periods]
Introduction to Artificial Intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI.

MODULE II: Problem Solving [09 Periods]
Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction.
Problem reduction and game playing: Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games.

MODULE III: Logic Concepts and Knowledge Representation [10 Periods]
A: Logic Concepts - Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.
B: Knowledge Representation - Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

MODULE IV: Expert System and Applications [10 Periods]
Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

MODULE V: Uncertainty Measure [09 Periods]
Probability theory: Introduction, Bayesian belief networks, certainty factor theory, dempster-shafer theory.
Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:

1. Saroj Kaushik, "**Artificial Intelligence**", CENGAGE Learning,
2. Stuart Russel, Peter Norvig, "**Artificial intelligence, A modern Approach**", 2nd ed, PEA
3. Rich, Kevin Knight, Shiv Shankar B Nair, "**Artificial Intelligence**", 3rd Ed, TMH
4. Patterson,"**Introduction to Artificial Intelligence**", PHI

REFERENCES:

1. George F Lugar, **"Atificial intelligence, structures and Strategies for Complex problem solving"**, 5th edition, PEA
2. Ertel, Wolf Gang, "**Introduction to Artificial Intelligence**", Springer
3. Blay WhitBY "**Artificial Intelligence**" Rosen Publishing.

E-RESOURCES:

1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-and-knight.pdf
2. https://books.google.co.in/books?id=pVR9W5LEZUwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. https://www.journals.elsevier.com/artificial-intelligence/
4. http://www.ceser.in/ceserp/index.php/ijai
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zRG3BvdUVy2TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12-lgOzTVbb5oZ6eQOBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

Course Outcomes:

At the end of the course, students will be able to

1. **Describe** the key components of the Artificial Intelligence field.
2. **Identify** various problem solving strategies.
3. **Construct** the solution for the problem using various logic and knowledge representation techniques.
4. **Interpret** the knowledge in various domains using expert systems.
5. **Discover** the solutions by using the probability theory and fuzzy logic.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	-	-									
CO2	-	2	2									
CO3	2	2	2	3								
CO4	2	2	2	2								
CO5	1	2										

2017-18 Onwards (MR-17)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech		
Code:82507	DRILLING AND BLASTING [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
To understand the principles and mechanism of different drilling methods, novel drilling techniques. To learn the basic mechanism of rock fragmentation by blasting. To know the various types of explosives and accessories used in blasting. To learn the different methods of blasting adopted in surface and underground coal / non-coal mines including adverse effects of blasting & their control

MODULE-I: Principles of Drilling and Drill bits   **[10 Periods]**
Principles of drilling: Principles of rock drilling, drill ability, drill ability index, factors affecting the drill ability, selection of drills.
Drill Bits: Various types of drill bits, study of bit life, factors affecting bit life, Thrust feed and rotation

MODULE-II: Explosives   **[10 Periods]**
Historical development, properties of explosives, low and high explosives, ANFO, slurries, Emulsion explosives, heavy ANFO, permitted explosives, testing of permitted explosives, bulk explosive systems-PMS, SMS, substitutes for explosives and their applications- hydrox, cardox, airdox.

MODULE-III: Firing of Explosives and blasting methods   **[10 Periods]**
A: Firing of Explosives: Safety fuse, detonating cord and accessories, detonators, Exploders, Electric firing and non-electric firing, electronic detonators, NONEL blasting.
B: Blasting methods: Preparation of charge, stemming and shot firing, choice and economical use of explosives, misfires, blown out shots, incomplete detonation, their causes, prevention and remedies.

MODULE-IV: Handling of Explosives   **[09 Periods]**
Surface and underground transport of explosives, storage and handling of explosives, magazines, accidents due to explosives, precautions and safety measures during transportation.

MODULE-V: Mechanics of blasting and effects of blasting   **[09 Periods]**
Mechanics of blasting: Factors affecting rock breakage using explosives, theory of shaped charge, detonation pressure, coupling, shock waves impedance, critical diameter.
Effects of blasting: Vibrations due to blasting and damage criteria, fly rocks, dust, fumes, water pollution and controlled blasting.

TEXT BOOKS:
1. Blasting in ground excavations and mines, Roy Pijush Pal, Oxford and IBH, 1st ed 1993
2. Drilling technology handbook, C.P. Chugh, Oxford and IBH, 1st ed, 1977 .

REFERENCES:
1. Rock blasting effect and operation, Roy Pijush Pal, A.A. Balkema, 1st ed, 2005
2. Elements of mining technology, Vol-1, D.J. Deshmukh, Central techno, 7th ed, 2001
3. Blasting operations, B.Hemphill Gary, Mc-graw Hill, 1st ed 1981
4. Explosive and blasting practices in mines, S.K.Das, Lovely prakashan, 1st ed, 1993.

E RESOURCES:
1. http://technology.infomine.com/reviews/blasting/welcome.asp?view=full
2. https://miningandblasting.wordpress.com/list-of-technical-papers/

Course Outcomes:
At the end of the course, students will be able to
1. Understand Principles of drilling and Various types of drill bits
2. Understand different types of Explosives
3. Understand Firing of Explosives and Blasting methods
4. Understand Handling of Explosives
5. Understand Mechanics of blasting and effects of blasting

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	1				3			
CO2	2	2	1	1	3				2			
CO3	3	2	3	3	2				1			
CO4	1	3	2	1	2				2			
CO5	1	1	2	2	1				2			

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak
Programme Outcomes(POs)

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech	
Code:82537	MATERIAL HANDLING [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

To introduce the basic principles in material handling and its equipment. To study the conveyor system and its advancement

MODULE-I: Bulk Handling Systems [10 Periods]

Basic principles in material handling exclusive to mining industry and its benefits. Classification of material handling equipments. Current state of art of bulk handling materials in mining in the world and Indian scenario; Selection of suitable types of systems for application. Stacking, blending, reclaiming and wagon loading, machinery and systems used at the stack yards; stock piles, silos, bunkers – their design, reclamation from them, various types of weigh bridges. Segregation - size wise and grade wise, Railway sidings.

MODULE-II: Short Conveyors and Haulage Systems [10 Periods]

Roller conveyor, overhead conveyor, screw conveyor, auger conveyor, apron feeder, bucket elevators, scraper haulage, conveyors in steep gradient, Armoured face conveyor, Off-highway Trucks, haul roads, In-pit crushers and modular conveyors, electric trolley assisted haulage, shuttle cars, skip hoist, winders, LHD's, pneumatic conveying, hydraulic transport.

MODULE-III: Belt Conveyor System [09 Periods]

A: Design, capacity, calculations with respect to the size, speed, troughing, power requirement, tension requirement, belt selection, factor of safety.

B: Developments in the design, of various components of belt conveyor systems such as; structures, rollers, gear boxes and motors, drums and pulleys, belting, ancillary components and safety gadgets.

MODULE-IV: New Types of Belt Conveyor Systems [09 Periods]

Curved conveyors, cable belts, pipe conveyors, rock belts – mine-run-rock conveyor, steel belt conveyors, steel slot conveyor, chain belt conveyors, etc., and other new developments, stackers and reclaimers, High Angle Conveyors (HAC); New inventions in HAC , Mobile or fixed installations; Woven wire belts, En Masse conveyor, Vibrating conveyor, gravity bucket conveyor.

MODULE-V: Material Handling in Mines, Plants and Workshops [10 Periods]

Mobile cranes, derrick cranes, pillar cranes, tower cranes, radial cranes, bridge cranes, fork lifters, overhead gantry material handling in workshops. Mineral handling in dimensional stone quarries, Mineral handling plants(coal, etc.,) Locomotives, rail tracks, rail cars, railways wagons; Aerial ropeways, gravity ropeways; Containers and shipping; Rope haulage - different types.

TEXT BOOKS:

1. Allegri (Sr.), T.H., Material Handling – Principles and Practices, CBS Publishers and Distributors, Delhi, 1987.
2. Hustrulid, W., and Kuchta, M. Open Pit Mine Planning & Design, Vol. 1, Fundamentals, Balkema, Rotterdam, 1998.

REFERENCES:
1. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990.
2. Deshmukh, D.J., Elements of Mining Technology, Vol.I, II and III, EMDEE Publishers, Nagpur, 1979.
3. Peng, S.S., and Chiang, H.S., Longwall Mining, John Wiley and Sons, New York, 1984.
4. Hartman, H.L., (Ed.), SME Mining Engg. Handbook Vol.I and II, Society for Mining,
5. Metallurgy, and Exploration, Inc., Colorado, 1992.

E RESOURCES:
1. www.bmt.org
2. www.canadianminingjournal.com/tag/material-handling/

Course Outcomes:

At the end of the course, students will be able to
1. Understand Basic principles in material handling exclusive to mining industry and its benefits
2. Understand Short Conveyors and Haulage Systems
3. Understand Belt Conveyor System
4. Understand New Types of Belt Conveyor Systems
5. Understand Material Handling in Mines, Plants and Workshops

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	1	2						1	
CO2	1	1	2	2	1						2	
CO3	1	2	3	3	2						2	
CO4	2	2	1	2	3						3	
CO5	2	2	1	2	3						2	

Prerequisites: NIL
Course objectives:
The course enables the students to be familiar with the recent developments in various technologies used in underground spaces includes tunneling and cavern projects across the world.

MODULE-I: Introduction **[10 Periods]**
Scope and application, historical developments, art of tunneling, tunnel engineering, future tunneling considerations. Types of Underground Excavations: Tunnel, adit, decline, shaft; parameters influencing location, shape and size; geological aspects; planning and site investigations.

MODULE-II: Tunnel Excavations **[10 Periods]**
Tunneling Methods: Types and purpose of tunnels; factors affecting choice of excavation technique; Methods - soft ground tunneling, hard rock tunneling, shallow tunneling, deep tunneling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered and remedial measures.

MODULE-III: Drilling and Blasting **[10 Periods]**
A:Drilling - drilling principles, drilling equipment, drill selection, specific drilling, rock drillability factors; Blasting - explosives, initiators, blasting mechanics
B:Types of cuts- fan, wedge and others; blast design, tunnel blast performance - powder factor, parameters influencing, models for prediction; mucking and transportation equipment selection.

MODULE-IV: Mechanization **[09 Periods]**
Tunneling by Road headers and Impact Hammers: Cutting principles, method of excavation, selection, performance, limitations and problems. Tunneling by Tunnel Boring Machines: Boring principles, method of excavation, selection, performance, limitations and problems; TBM applications.

MODULE-V: Tunnel Services **[09 Periods]**
Supports in Tunnels: Principal types of supports and applicability. Ground Treatment in Tunneling: Adverse ground conditions and its effect on tunneling; Excavation of large and deep tunnels, caverns. Tunnel Services: Ventilation, drainage and pumping; Tunneling hazards.

TEXT BOOKS:
1. Hudson, J.A., Rock Engineering Systems – Theory and practice, Ellis Horwood, England.
2. Clark, G.B., (1987), Principles of Rock Fragmentation, John Wiley and Sons, New York.

REFERENCES:

1. Legget, R.F., Cities and Geology, McGraw-Hill, NewYork, 624 p., 1973.
2. Johansen, John and Mathiesen, C.F., Modern Trends in Tunnelling and Blast Design, AA Balkema, 154p, 2000.
3. Per-Anders Persson, Roger Holmberg, Jaimin Lee, (1993), Rock blasting and explosives Engineering, CRC Press, p.560.
4. Bickel, J.O., Kuesel, T.R. and King, E.H., Tunnel Engineering Handbook, Chapman & Hall Inc., New York and CBS Publishers, New Delhi, 2nd edition, Chapter 6, 544p, 1997.

E-RESOURCES:

1. www.cowi.com/.../bridgetunnelandmarinestructures/tunnels/.../021-1700-020e-10b_
2. https://miningandblasting.wordpress.com/list-of-technical-papers/

Course Outcomes:

At the end of the course, students will be able to

1. Understand art of tunneling, tunnel engineering, future tunneling considerations
2. Understand different types Tunneling Methods
3. Understand drilling principles, drilling equipment, explosives, initiators, blasting mechanics
4. Understand tunneling by different machines
5. Understand Tunnel Services

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	3					2		
CO2	2	3	1	2	3							
CO3	2	3	1	2	3							
CO4	2	3	1	2	3					3		
CO5	2	3	1	2	3							

Prerequisites: Nil
Course Objectives:
To build business English vocabulary and grammar through lessons on the latest topics in the business world and to upgrade the learners communication and presentation skills and make the students competent in communication at an advanced level. In addition to the earlier mentioned, this course gives a room to groom the learners' personality and make the students self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills by giving hands-on experience about business presentations and attending team meetings.

Module – I: Communication Skills [10 Periods]
Types of communication-Oral, aural and written, reading-Word Power-Vocabulary-technical vocabulary, Rate of speech- pitch, tone-clarity of voice.

Module – II: Conversation Skills [10 Periods]
Informal and Formal conversation, Verbal and Non - verbal communication. Barriers to effective communication - Kinesics

Module – III: Reading Skills [10 Periods]
A: Types of reading–reading for facts, guessing meaning from context.
B: Strategies of reading- scanning, skimming, inferring meaning, critical reading.

Module – IV: Creative Writing [10 Periods]
Letter-writing-business letters-pro forma culture-format-style-effectiveness, promptness-Analysis of sample letters collected from industry-email, fax, Essay writing-nuances of essay writing, types of essays,

Module - V: Writing Skills [10 Periods]
Characteristics of writing – mechanics of writing – methodology of writing – format & style- structures of writing – circular writing – memo writing – instructions writing, Report Writing, SOP.

REFERENCES:
1. Rajendra Pal S Korlaha ,Essentials of Business Communication, Hi: Sultan Chand & Sons, New Delhi.
2. Andrew J. Rutherford , Basic Communication Skills for Technology,: Pearson Education Asia, Patparganj, New Delhi-92.
3. V. Prasad, Advanced Communication skills, Atma Ram Publications, and New Delhi.
4. Raymond V. Lesikav; John D.Pettit Jr.; Business Communication: Theory & application, All India Traveler Bookseller, New Delhi-51

5. R K Madhukar, Business Cimmunication, Vikas Publishing House Pvt Ltd

E- RESOURCES:
1. https://blog.udemy.com/types-of-communication/ (Communication Skills)
2. https://www.skillsyouneed.com/ips/conversational-skills.html   (Conversation Skills)
3. http://lrs.ed.uiuc.edu/students/jblanton/read/readingdef.htm (Reading Skills)
4. https://www.thoughtco.com/what-is-composition-english-1689893   (Writing and composition)
5. http://www.journals.aiac.org.au/index.php/IJALEL/article/view/2471   (Writing Skills)
6. https://www.youtube.com/watch?v=cQruENyLNYI&list=PLbMVogVj5nJSZB8B V29_sPwwkzMTYXpaH   (Communication Skills)

Course Outcomes:
 At the end of the course, students will be able to
1. Understand the importance of various forms of non-verbal communication.
2. Participate confidently in business meetings.
3. Gain an understanding about different types of reading skills and employ the same during competitive exams.
4. Recognize the importance of writing in real time situations.
5. Improve the skills necessary to meet the challenge of using English in the business world.

<table>
<tr><td colspan="13">CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes(POs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>1</td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td>2</td><td></td><td>1</td><td>2</td></tr>
<tr><td>CO3</td><td></td><td>2</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>2</td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>3</td></tr>
</table>

Prerequisites: NIL

Course Objectives:

To determine how well the students can develop a compelling argument in writing for an academic audience. Further helps them to involve in critical thinking and persuasive writing exercises. This course also intends to develop effective writing skills to analyze and evaluate the data and ideas for better comprehension. On the other hand this course encourages students to learn strategies for becoming accurate readers and critical analysts.

Module – I: Interpretation and Types of Reading   **[10 Periods]**
- Interpretation in different settings
- Understanding the main ideas in the text
- Reading for inference
- Reading for theme
- Reading for interpretation

Module –II: Approaches to Reading   **[10 Periods]**
- Biographical
- Historical
- Gender
- Sociological

Module – III: Critical Reading   **[10 Periods]**
- The Theme
- Setting
- Point of View
- Characters
- Plot
- Analysis
- Interpretation

Note: This module should be dealt with reference to *Animal Farm* by George Orwell

Module - IV: Analytical Writing   **[09 Periods]**
- Argumentation
- Sequencing
- Analyze an ISSUE
- Analyze an Argument
- Verbal Reasoning
- Interpretive Reports

Note: This module should be dealt with reference to Essays written by Somerset Maugham/ Russell/Aldous Huxley

Module – V: Creative Writing   **[09 Periods]**

- Figurative Language
- Imagery
- Writing a short Poem
- Writing a short Story

REFERENCES:
1. GRE by CliffsTestPrep-7th edition
2. GRE Exam- **A Comprehensive Program**
3. M H Abraham **Glossary of English Literary terms**
4. GD Barche **Interpreting Literature- A Myth and a Reality**
5. Wilbur Scott- **Five approaches to literary criticism**.

E- RESOURCES:
1. http://www.brad.ac.uk/staff/pkkornakov/META.htm(Introduction to Inter pretation Skills)
2. http://literacyonline.tki.org.nz/Literacy-Online/Planning-for-my-students-needs/Effective-Literacy-Practice-Years-1-4/Approaches-to-teaching-reading (Approaches to Reading)
3. https://www.csuohio.edu/writing-center/critical-reading-what-critical-reading-and-why-do-i-need-do-it (Critical Reading)
4. https://www.ets.org/gre/revised_general/about/content/analytical_writing (Analytical Writing)
5. http://www.writerstreasure.com/creative-writing-101/ (Creative Writing)

Course Outcomes:
At the end of the course, students will be able to:
1. Think critically and help in writing analytically.
2. Get real life experiences through interpretation of literature.
3. Learn strategies for becoming accurate readers and critical analysts
4. Think logically towards social, political, economical, legal and technological issues.
5. Draw their career vision and mission independently.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			1	2				2		1	2	
CO2										2	1	
CO3			1			2	1			1		
CO4						1		2				1
CO5				1		1						1

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80H09	ENGLISH FOR ACADEMIC AND RESEARCH WRITING [OPEN ELECTIVE]	L	T	P
Credits: 3		3		-

Prerequisites: NIL
Course Objectives:
This paper helps the students use pre-writing strategies to plan writing. Further it improves writing through the process of drafting essays, reports, abstracts, etc. In addition to this, it improves accuracy and complexity of Sentence structure in academic writing. On the other hand the student will be able to analyze and interpret data . This course also intends to develop research skills to identify and incorporate relevant resources for research writing.

Module I   Features of Academic writing   [09 periods]
Language: Clear, Correct, Concise, Inclusive language
Tone: Formal, Objective, Impersonal, Cautious tone
Style: Appropriate, Accurate, Organized, Empirical style
Ethics: Honesty, Integrity, Responsibility, Accountability

Module II   Kinds of Academic writing   [09 periods]
Essays, Reports, Reviews, SOPs, Abstracts, Proposals

Module III   Academic Writing Skills   [10 periods]
   ❖ Paraphrasing
   ❖ Summarizing
   ❖ Quoting
   ❖ Rewriting
   ❖ Expansion

Module IV   Research Process   [10 periods]
Selection of Topic, Formulation of Hypothesis, Collection of Data, Analysis of Data, Interpretation of Data, Presentation of Data

Module V   Structure of a Research Document   [10 periods]
Title, Abstract, Introduction, Literature Survey, Methodology, Discussion, Findings/Results, Conclusion, Documenting Sources

REFERENCES:
1. Zemach, D. & Rumisek, L. 2005.Academic Writing: from Paragraph to Essay, Oxford, Macmillan
2. Swales, J. & Feak, C. 2004. Academic Writing for Graduate Students: Essential Tasks and Skills. Ann Arbor, University of Michigan Press.
3. Sword, H. 2012. Stylish Academic Writing, Cambridge, MA. Harvard University Press.

4. Williams, J.M. & Bizup, J. 2014.Style: Lessons in Grace and Clarity.11th ed. Boston, Pearson
5. Weissberg, R. & Buker, S. 1990.Writing up Research: Experimental Research Report Writing for Students of English Englewood Cliffs, Prentice Hall Regents.
6. Englander, K. 2014. Writing and Publishing Science Research Papers in English: A global perspective. Heidelberg. Springer Briefs in Education

E RESOURCES:
1. https://writing.wisc.edu/Handbook/index.html
2. https://brians.wsu.edu/common-errors/
3. http://www.gutenberg.org/ebooks/37134
4. http://nptel.ac.in/courses/109106094/26(**Academic Writing and Linking Words**)
5. https://www.researchgate.net/journal/14751585_Journal_of_English_for_Academic_Purposes
6. https://www.sciencedirect.com/journal/journal-of-english-for-academic-purposes/v ol/7/issue/2

Course Outcomes:
At the end of the course, students will be able to:
1. Write effective and appropriate introduction and conclusion
2. Use a wide range of academic words correctly and appropriately.
3. Write a variety of effective sentences that contain appropriate cohesive devices, connectors and transition words.
4. Identify relevant outside source material and integrate it appropriately in writing.
5. Find out results and draw conclusions for research documentation.

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1	2			2			2	2	
CO2										2	1	1
CO3				1	1					1	2	1
CO4		1	1								1	
CO5				2		1				2	2	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech.	
Code: 80B11	COMPUTATIONAL MATHEMATICS [OPEN ELECTIVE]	L	T	P
Credits: 3		3	0	-

Pre-requisites: NIL

Course Objectives:

The objective of this course is to introduce various numerical techniques which are indispensable tools to solve many algebraic and transcendental equations. Various methods are used to reduce the global error involved in approximations. This course fills into this perceived need. The treatment should be informed by the fact that not only conceptual but also (and in some cases) more importantly numerical or computational methods are of essence.

Module I: Algebraic and Transcendental Equations   [09 periods]

Solution of Algebraic and Transcendental Equations: Introduction - Bisection Method - Method of False Position - Iteration Method – Newton-Raphson Method - Ramanujan's Method. Jacobi – Gauss Seidel Methods for solving linear systems, Power Method.

Module II: Interpolation   [10 periods]

Introduction, Errors in Polynomial Interpolation, Finite differences, Forward Differences-Backward differences, Symbolic relations and separation of symbols, Differences of a polynomial-Newton's formulae for interpolation

Central difference interpolation Formulae, Gauss Central Difference Formulae, Interpolation with unevenly spaced points: Lagrange's Interpolation formula.

Module III: Curve fitting, Numerical Differentiation & Integration [10 periods]

A: Curve fitting: Fitting a first degree (linear) and second degree (parabola), exponential, power curves for a data by the Method of least squares.

B: Numerical Differentiation: Evaluation of derivatives, Evaluation of maximum & minimum for a given data. Numerical Integration: Trapezoidal Rule, Simpson's $1/3^{rd}$, $3/8^{th}$ Rule.

Module IV: Numerical solution of Ordinary Differential Equations [10 periods]

Solution by Taylor's series method - Picard's Method of successive Approximations - Euler's Method-Modified Euler's Method – Runge-Kutta Methods. Predictor-Corrector Methods: Milne's method - Adams- Bashforth Method.

Module V: Numerical Solution of Partial Differential Equations   [09 periods]

Classification of second order equations – Finite difference approximations to derivatives - standard 5 point formula – diagonal 5 point formula – solution of Laplace equation.

Solution of poisson's equation. Solution of one dimensional heat, wave equations (by Crank-Nicolson explicit/implicit formula only).

TEXT BOOKS:
1. Atkinson & Han, Elementary Numerical Analysis, 3rd Edition, Wiley Publications.
2. Francis Scheid, Numerical Analysis, Schaum's Outlines, 2nd Edition, Tata Mc. Graw Hill Publications.

REFERENCES:
1. M K Jain, et.al, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers.
2. James F Epperson, An Introduction to Numerical Methods and Analysis, Revised Edition, Wiley Publications.
3. V Rajaraman, Computer Oriented Numerical Methods, 3rd Edition, Pritice Hall India.
4. M K Jain, SRK Iyyengar, Numerical Methods for Scientific and Engineering Computation, 4th Edition, Newage International Publishers.
5. S S Sastry, Introductory Methods of Numerical Analysis, 5th Edition, Printice Hall India.

E RESOURCES:
1. http://www.simumath.com/library/book.html?code=Alg_Equations_Examples (Algebraic and transcendental equation text book by YURG BERENGARD)
2. http://jupiter.math.nctu.edu.tw/~smchang/9602/NA_lecture_note.pdf (Interpolation)
3. http://www.sam.math.ethz.ch/~hiptmair/tmp/NPDE10.pdf (Numerical Solution of Partial Differential Equations)
4. http://www.iosrjournals.org/iosr-jm/papers/Vol6-issue6/J0665862.pdf (Interpolation)
5. http://www.wseas.org/multimedia/journals/mathematics/2014/a045706-398.pdf (Curve fitting)
6. http://nptel.ac.in/courses/111107063 (Numerical solution of Ordinary Differential Equations)
7. http://nptel.ac.in/courses/111105038 (Numerical Solution of Partial Differential Equations)

Course Outcomes:
At the end of the course, students will be able to:
1. Apply numerical methods to solve some algebraic and transcendental equations to the desired level of accuracy.
2. Application of interpolation concept to evaluate missed data in data analysis.
3. Application of least squares method to solve data analysis problems and able to find the differentiation and integration by using numerical techniques.
4. Apply differential equations in engineering oriented problems and to observe patterns by using numerical techniques.
5. To find out the Numerical solution of partial differential equations.

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2				3			2
CO2	3	3	2	3	3				3			2
CO3	3	3	2	3	2				2			2
CO4	3	3	2	2	3				3			2
CO5	3	3	2	3	2				3			2

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Pre-requisite: Basic concepts of statistics
Course Objectives:
Uncertainty is found everywhere. It is therefore essential to understand the techniques for handling and modeling it. This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes and decision making. These would come in handy for the prospective engineers in most branches.

Module - I: Analysis of Variance & Analysis of Co-variance   [10 periods]
Analysis of Variance (ANOVA): one-way & two-wav ANOVA and multiple comparisons. Design of Experiments: Importance and applications of design of experiments. Principles of experimentation, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D)

Module - II: Design of Experiments   [10   periods]
Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Introduction to Factorial design - 2^2 and 2^n Factorial design. Analysis of Co-variance (ANCOVA) (Only one way). Conducting ANCOVA – Two way Comparison of the efficiencies of above designs.

Module - III: Statistical Quality Control   [10 periods]
A:Importance of SQC in industry. Statistical basis of Shewart control charts. Construction of control charts for variables (mean,range and standard deviation) and attributes (p,np,c&d charts with fixed and varying sample sizes).
B:Interpretation of control charts. Natural tolerance limits and specification limits process capability index. Concept of Six sigma and its importance, Single and double sampling plans.

Module - IV: Multiple Regression &Time Series   [09 periods]
Multiple Regression for n- independent variables**.**
Time Series : Fitting a trend line to a time series, Method of least Squares and Method of Moving Averages, Measure of Seasonal Variation.

Module - V: Queuing Theory   [09 periods]
Structure of a queuing system, Operating Characteristics of queuing system, Transient and Steady states, Terminology of Queuing systems, Arrival and service processes, Pure Birth-Death process Deterministic queuing models, (M/M/1):(∞:FIFO) Model, (M/M/1):(N:FIFO) Model .

TEXT BOOKS:
1. Monte Gomery, **"Applied Statistics and Probability for Engineers"**, 6th Edition, Wiley Publications.

2. J K Sharma, **"Operations research Theory and applications"** Macmillan publishers india limited,4th edition.
3. Paul A Maeyer Introductory Probability and Statistical Applications, John Wiley Publicaitons.

REFERENCES:
1. Willam Feller : **"Introduction to Probability theory and its applications"**.Volume –I ,Wiley 2.
2. Goon AM, Gupta MK, Das Gupta B : **"Fundamentals of Statistics"**, Vol-I, the World Press Pvt.Ltd. , Kolakota.
3. V.K.Kapoor and S.C.Gupta: **"Fundamentals of Mathematical Statistics"**, Sultan Chand &Sons, New Delhi

E- RESOURCES:
1. https://onlinecourses.science.psu.edu/stat502/node/183 (ANCOVA)
2. http://www.uoguelph.ca/~dsparlin/sqc.htm (StatisticalQualitycontrol)
3. http://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_Angol.pdf (Basic Queueing Theory)
4. http://www.ijpcsonline.com/files/34-781.pdf (Design of Experiments)
5. http://nptel.ac.in/courses/110106064/5 (Introduction to Data Analysis)
6. http://nptel.ac.in/courses/111104075/ (ANOVA and Design of Experiments)

Course Outcomes:
At the end of the course, students will be able to:
1. Perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
2. Advanced design of experiments and their applications.
3. The students will learn the concept of quality control, Six Sigma and its importance to real life problems.
4. The student will be able to understand the concept of Multiple regression and Application of Time-series,
5. The students would be able to find the expected queue length, the ideal time, the traffic intensity and the waiting time. These are very useful tools in many engineering and data management problems in the industry. It is useful for all branches of engineering.

	CO- PO Mapping											
	(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	3	1				3			1
CO2	3	2	2	3	3							1
CO3	3	2	2	3	2				2			2
CO4	3	2	2	2	1				3			2
CO5	3	2	2	3	2				3			2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B13	OPTIMIZATION TECHNIQUES [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic concepts of Linear Programming

Course Objectives: This course deals with the extremely important topics under the broad umbrella of optimization. This is synonymous with efficiency which is the underlying prime rationale for all scientific and technological advances and progress.

MODULE - I: Introduction and Basic Concepts of Optimization [10 Periods]
Historical Development; Engineering applications of Optimization; Art of Modeling - Objective function; Constraints and Constraint surface; Formulation of design problems as mathematical programming problems.

MODULE - II: Optimization using Calculus [9 Periods]
Classification of optimization problems Optimization techniques – classical and advanced techniques. Stationary points; Functions of single and two variables; Global Optimum - Convexity and concavity of functions of one and two variables - Optimization of function of one variable and multiple variables; Gradient vectors;

MODULE - III: Linear Programming Applications [10 Periods]
A: Optimization of function of multiple variables subject to equality constraints; Lagrangian function Optimization of function of multiple variables subject to equality constraints.
B: Hessian matrix formulation; Eigen values Kuhn-Tucker Conditions; Post optimality analysis - Other algorithms for solving LP problems – Karmarkar's projective scaling method

MODULE – IV: Dynamic Programming [10 Periods]
Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality - Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP)

MODULE – V: Applications of Dynamic Programming [9 Periods]
Problem formulation and application in Design of continuous beam and Optimal geometric layout of a truss - Water allocation as a sequential process - Capacity expansion and Reservoir operation

TEXT BOOKS:
1. S.S. Rao,"Engineering Optimization: Theory and Practice", New Age Internatio nal (P) Ltd., New Delhi, 2000.
2. G. Hadley,"Linear programming", Narosa Publishing House, New Delhi, 1990.

REFERENCES:
1. H.A. Taha,"Operations Research:An Introduction", 5th Edition, Macmillan, New York, 1992.
2. K.Deb,"Optimization for Engineering DesignAlgorithms and Examples",Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.

3. K.Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management",PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.288,

E-Resources
1. http://www.mhhe.com/engcs/industrial/hillier/etext/PDF/chap03.pdf (LPP)
2. http://ocw.nctu.edu.tw/upload/classbfs121001503719748.pdf
3. http://shodhganga.inflibnet.ac.in/bitstream/10603/19544/12/7_chapter%201.pdf
4. http://www.ime.unicamp.br/~andreani/MS515/capitulo12.pdf

Course Outcomes:
At the end of the course, students will be able to:
1. Understand the historical development of OR and formulate the design problems.
2. Find the optimum values using calculus
3. Apply the linear programming techniques to solve the engineering problems
4. Know the various concepts of Dynamic Programming.
5. Apply the Dynamic Programming techniques to solve the engineering problems

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											
	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	3		2		2	2		1
CO2	3	2	2	2	2		2	3	1	2	2	1
CO3	3	2	2	3	2		2		2	2	2	2
CO4	3	2	2	2	2		2	3	3	3	2	2
CO5	3	2	2	2	2		1			2		2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B14	ADVANCED PHYSICS FOR ENGINEERS [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
The objective of this course is to make the students familiar with the recent advanced concepts in physics

Module I: Special Theory of Relativity: [09 Periods]
Introduction, Concept of theory of relativity, Frames of reference-Inertial, non-inertial; Galilean transformation equations, Michelson-Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Time dilation, Variation of mass with velocity, Relativistic relation between energy and momentum.

Module II: Holography   [09 Periods]
Introduction, Basic principle, Construction and Reconstruction of Hologram, Properties of Hologram, Types of Holograms, Applications- Holographic Interferometry, Acoustic Holography, Holographic Microscopy.

Module III: Thin films Synthesis and Characterization   [06 Periods]
A: Synthesis - Introduction, Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).
B: Characterization   [06 Periods]
X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, Atomic   Force Microscopy.

Module IV: Photonic Crystals   [09 Periods]
Important features of photonic crystals, Presence of photonic band gap, anomalous group velocity dispersion, Micro cavity, effects in Photonic Crystals, fabrication of photonic Crystals, Dielectric mirrors and interference filters, PBC based LEDs, Photonic crystal fibers (PCFs), Photonic crystal sensing.

Module V: Solar cell Physics   [09 Periods]
Single, poly and amorphous silicon, GaAs, CdS, Cu2S, CdTe; Origin of photovoltaic effect, Homo and hetero junction, working principle of solar cell, Evaluation of Solar cell parameters, I-V, C-V and C-f characteristics.

TEXT BOOKS:
1. R K Gaur and SL Gupta, "**Engineering Physics" Dhanpat Rai Publications, 8th revised** Edition, 2006.
2. B K Pandey and S Chaturvedi, "**Engineering Physics" Cengage Learning India,** Revised Edition, 2014.

REFERENCES:

1. R F Bun shah, "**Hand Book of Technologies for Films and coating", Noyes** publishers, 1st Edition, 1996.

2. B E A Saleh and A C Tech, *"Fundamentals of Photonics", John Wiley and Sons,* New York, 1st Edition, 1993.

3. K L Chopra and S R Das, "**Thin film Solar Cells", Plenum press, 1st Edition 1983.**

4. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics" S Chand** and Co 1st Edition, 2008.

E-RESOURCES:

1. http://physics.mq.edu.au/~jcresser/Phys378/LectureNotes/SpecialRelativityNotes.pdf

2. http://www.kfupm.edu.sa/centers/CENT/AnalyticsReports/KFUPM-TFSC-Dec20.pdf

3. https://www.journals.elsevier.com/solar-energy-materials-and-solar-cells

4. https://www.journals.elsevier.com/journal-of-alloys-and-compounds/

5. http://aip.scitation.org/journal/apl

6. http://nptel.ac.in/courses/115101011/

7. http://nptel.ac.in/courses/117103066/11

Course Outcomes:

At the end of the course, students will be able to:

1. be aware of the concepts of special theory of relativity.
2. Analyze the basic concepts of Holography and applications.
3. Acquire the knowledge on synthesis methods of thin films and their characterization techniques.
4. Develop basic knowledge on the photonic crystals
5. Apply the basic concepts of solar cell physics.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1									
CO2	3	2	1									
CO3	3	1	1		1	1						
CO4	2	1	1									
CO5	3	2	1		3	2	2					

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B15	NANO MATERIALS [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Physics
Course Objectives:
The objective is to provide different methods of synthesis and characterization of nano materials.

Module I: Physical Methods [09 periods]
Bottom-up approach and Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, molecular beam epitaxial, and electro deposition.

Module II: Chemical methods [08 periods]
Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

Module III: Thermal Methods & Surface Characterization
A: Thermal Methods: [07 periods]
Thermolysis route – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.
B: Surface Characterization [07 periods]
Scanning electron microscopy (SEM), Transmission electron microscopy (TEM). Photo luminescence Spectroscopy.

Module IV: Compositional and structural Characterization techniques
[09 periods]
X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, and Electron probe microanalysis(EPMA).

Module V: Properties and Applications of Nano materials [08 periods]
Carbon Nano Tube (CNT) – Single-Wall Carbon Nano Tube (SWCNT), Multi-wall carbon Nano tube (MWCNT), Activated carbon, Fullerene, Graphene, Quantum wire and Quantum dots

TEXT BOOKS:
1. C N R Rao, A Muller and A K Cheetham **"The chemistry of Nano materials: Synthesis, Properties and Applications"** John Wiley, First Edition, 2004
2. Hari Singh Nalwa, **"Nano structured Materials and Nanotechnology",** Academic Press, First Edition, 2002.

REFERENCES:

1. Charles P Poole Jr "**Introduction to Nanotechnology",** John Willey & Sons, 1st Edition, 2003
2**.** C Dupas, P Houdy, M Lahmani, Nanoscience**: "Nanotechnologies and Nano physics",** Springer-Verlag Berlin Heidelberg, 1st Edition, 2007
3. T Pradeep, "**NANO: The Essentials: Understanding Nanoscience and Nanotechnology".** Tata McGraw-Hill Publishing Company Limited, Revised Edition, 2007
4. Z L Wang, "**Characterization of Nano phase Materials"** Wiley-VCH, 1st Edition**,** 2000.
5. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics" S** Chand and Co 1st Edition, 2008.

E-RESOURCES:

1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf
2. http://courses.washington.edu/overney/NME498_Material/NME498_Periods/Lecture4- Overney-NP-Synthesis.pdf
3. http://www.materialstoday.com/nanomaterials/journals/
4. https://www.journals.elsevier.com/nanoimpact
5. http://www.springer.com/materials/nanotechnology/journal/12274
6. http://nptel.ac.in/courses/118104008/
7. http://nptel.ac.in/courses/118102003/

Course Outcomes:
At the end of the course, students will be able to:
1. be aware of different physical methods of synthesis of nano materials.
2. be aware of different chemical methods of synthesis of nano materials.
3. Understand different thermal methods of synthesis of nano materials and to learn different surface characterization techniques.
4. acquire the different compositional and structural characterization techniques.
5. develop basic knowledge on the properties and applications of few nano

CO – PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1										
CO2	2	1										
CO3	2	1										
CO4	3	2	2		2							
CO5	3	2	2		2							

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B16	NDT and VACUUM TECHNOLOGY [OPEN ELECTIVE]	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Physics
Course Objectives:
The objective is to provide a basic level of understanding on Non-destructive testing and Vacuum technology.

Module I: Introduction to Non destructive testing   [06 periods]
Introduction, Objectives of Non destructive testing, Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage.

Module II: Methods of Non destructive Testing   [09 Periods]
Liquid penetration method, Dye penetration method, Radiographic testing, Ultrasonic Inspection method, Pulse Echo method, Magnetic particle testing, Eddy current Testing.

Module III: Introduction to Vacuum Technology and Flow meters
A: Introduction to Vacuum Technology   [09 Periods]
Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of particle flux, mono layer formation time, pressure; Elementary gas transport phenomena; Knudsen's and Reynolds' numbers; Throughput, mass flow and conductance;
B: Flow meters   [07 Periods]
Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure techniques;

Module IV: Pressure gauges   [08 Periods]
Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge

Module V: Vacuum Pumps   [09 Periods]
Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps

TEXT BOOKS:
1. B K Pandey, S Chaturvedi, **"Engineering Physics", Cengage learning,** 1st Edition, 2014
2. John. F. O'Hanlon**, "A User's guide to Vacuum technology",** Wiley, 3rd Edition**, 2003

REFERENCES:
1. M R Srinivasan, **"Physics for Engineers",** New Age international, 1st reprint, 2007
2. R K Gaur and S L Gupta, "**Engineering Physics",** Dhanpat rai, Reprint, 2006
3. Krishna Seshan, "**Hand Book of Thin film deposition", Noyes,** 2nd Edition, 2002

E-RESOURCES:
1. http://www.enfm.net/catalog/catalog/enfm-usa.pdf
2. http://web.itu.edu.tr/~arana/ndt.pdf
3. http://www.issp.ac.ru/ebooks/books/open/Nondestructive_Testing_Methods_and_New_Applications.pdf
4. https://www.journals.elsevier.com/ndt-and-e-international/
5. https://www.journals.elsevier.com/vacuum
6. http://nptel.ac.in/courses/114106035/35
7. http://nptel.ac.in/courses/112101004/37

Course Outcomes:
At the end of the course, students will be able to:
1. aware of the concepts of NDT
2. Understand different methods of NDT.
3. Analyze Vacuum technology and concepts of flow meters.
4. Develop pressure gauges.
5. Understand the concepts of different vacuum pumps

COs	CO – PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	2										
CO3	3	2			2							
CO4	2	2			2							
CO5	2	2			2							

Prerequisites: Nil

Course Objectives:

The objective is to make the students know about the concept of phase rule and alloys, phase diagrams of different systems. To give knowledge to the students regarding liquid crystals, abrasives, glass, ceramics, refractories, colloids and adhesives. To make the students for understand the basic concepts of chemistry to develop futuristic materials for high-tech. applications in the area of engineering.

MODULE I: Phase Rule and alloys [10 Periods]

Phase Rule: Definition of terms: Phase, component, degree of freedom, phase rule equation. Phase diagrams-one component system-water system. Two component system Lead-Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization. Introduction to alloys-fabrication of alloys-ferrous alloys-nonferrous alloys-industrial applications.

MODULE II: Composites, Abrasives and Adhesives [10 Periods]

Composites: Basics of composites, composition and characteristics-types of composites –particle and fiber reinforced composites and their applications. Abrasives- natural and artificial abrasives-grinding wheels-abrasive paper and cloth. Adhesives- classification -action of adhesives- factors influencing adhesive action development of adhesive strength.

MODULE III: Cement and Concrete [10 Periods]

A: Introduction-Classification of cement-natural-chemical composition of cement-port land cement-chemical reactions involved in setting and hardening of cement-additives for cement-mortars.

B: Concretes-pre stressed concrete-post tensioning-curing-overall scenario of cement industry-Reinforced concrete, constructions-testing and decaying of cement-prevention of cement decay.

MODULE IV: Glass, Ceramics and Refractories [09 Periods]

Structure of glass-properties-Manufacturing of glass-Types of glasses-uses Ceramics-clays-methods for fabrication of ceramic ware plasticity of clays. Ceramic products-glazes. Porcelain and vitreous enamels. Requisites of a good refractory-classification, properties and applications of refractories.

MODULE V: Colloids and surfactants [09 Periods]

Introduction to solution-types of colloids-characteristics of lyophilic and lyophobic solutions-preparation of colloids (Dispersion methods & Aggregation methods)-purification of colloids (Dialysis, Electrodialysis and Ultrafiltration). Characteristics of colloidal solutions-coagulation of colloids-origin of charge on colloids-protective colloids-emulsions-gels-applications of colloids. Introduction to surfactants-classification of surfactants-CMC (critical micelle concentration)-HLB scale-detergents-cleaning action.

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "**A text Book of Engineering Chemistry**", DhanpatRai Publications, New Delhi, 12th Edition 2006.

2. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, **"Text Book of Engineering chemistry"** , Cengage Learning India Pvt.Ltd,2016.

3. J. Goodwin, **"Colloids and Interfaces with Surfactants and Polymers"** 2nd Edition 2009.

REFERENCES:

1. B.R.Puri, L.R.Sharma and M.S.Pathania,"**Principles of Physical Chemistry",** S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.

2. M.Thirumala Chary and E.Laxminarayana, **"Engineering Chemistry"**, SciTech publications (INDIA) PVT Ltd, Third Edition, 2016.

E-RESOURCES:

1. www.istl.org/02-spring/internet.html (Basics on materials)
2. http://www.zzm.umcs.lublin.pl/Wyklad/FGFAng/7A.F.G.F.%20Colloids.Emuls.pdf (colloids)
3. Journal of materials science (Springer publishers)
4. Journal of materials science and technology (Elsevier publishers)
5. nptel.ac.in/courses/105102012/ (Cement concrete technology)
6. http://www.nptel.ac.in/courses/112104039/53 (liquid crystals)

Course Outcomes:

At the end of the course, students will be able to:

1. Interpret the vitality of phase rule in metallurgy and application of phase rule to one and two component systems.
2. Understand the concepts of abrasives, adhesives and liquid.
3. The immense importance of basic constructional material, Portland cement in Civil Engineering works.
4. To acquire the knowledge about properties and applications of glass, ceramics and refractories.
5. Understand the relationships between macroscopic material properties and microscopic structures.

COs	**CO- PO Mapping** **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**
	Programme Outcomes(POs)
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		1		1							
CO2	2	1	1	1								
CO3	1	3		1	1							
CO4	1	1	1	2								
CO5	1	1		1	1	2	1					

Prerequisites: NIL

Course Objectives:

The objective is to make the learners know about the scope of nano scale materials and their versatile properties. To give knowledge of various instrumental techniques to the analysis the nano materials. To make aware of the learners of different applications of nano materials.

MODULE I : Nanochemistry-I [09 Periods]

Introduction -synthesis of nanostructure materials, Bottom-up approach and Top-down approach with examples-sol-gel method-solvothermal and hydrothermal routes, Chemical Vapor Deposition and precipitation methods.

MODULE II: Nanochemistry-II [10 Periods]

Properties of nanomaterials-Electronic properties, Energy bands and gaps in semiconductors, Fermi surfaces-Optical properties- Fluorescence/luminescence, Photoluminescence/fluorescence, Electroluminescence, quantum dot. Magnetic properties-mechanical properties-thermal properties.

MODULE III: Instrumental Analysis [10 Periods]

A: Characterization techniques: Scanning Electron Microscopy (SEM), Electron Dispersion Spectroscopy (EDS).

B: Transmission Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy (AFM) -Illustrative examples.

MODULE IV: Carbon Nanotubes and Application [10 Periods]

Carbon Nanostructures, types and preparation of Carbon Nanotubes. Nanostructured crystals. Graphene, Carbon nanofibers- Carbon clusters and Fullerenes- optical and telecommunication applications. Organic NanoSolar cells and its applications.

MODULE V: Environmental Nanotechnology [09 Periods]

Implications of Nanotechnology & Research needs-Nanostructured Catalysts TiO_2 Nanoparticles for Water purification- Nano membranes in drinking water treatment and desalination, Nanomembranes in Sea desalination-Nano particles for treatment of Chlorinated Organic Contaminants.

TEXT BOOKS:

1. Mark A. Ratner, D. Ratner. **"Nanotechnology a gentle introduction to the next big idea"**,Pearson Education Inc., Asia, 2003.
2. Pradeep.T. "Nano: The essentials-understanding nanoscience and nanotechnology". Tata Mc.Graw Hill, New Delhi, 2007.

REFERENCES:

1. A. K. Haghi, Ajesh K. Zachariah, NandakumarKalariakkal. **"Nanomaterials: Synthesis, Characterization, and Applications"**. Apple Academic Press, 2013.
2. Brechignac C., Houdy P., Lahmani M. (Eds.) **"Nanomaterials and Nanochemistry"** (Springer,) 748p. ISBN 978-3-540-72993-8, 2007
3. Phanikumar. **"Principles of nanotechnology",**Scitech Publications 2nd Edition, 2010.
4. Preetijain, Shankar lalGarg. **"Environmental Nanotechnology"** Lap lambert Academic publishing, 2015.

E- RESOURCES:

1. www.docbrown.info/page03/nanochem02.htm (Nanochemistry applications)
2. https://books.google.co.in/books?isbn=352732626X (concepts of nanochemistry)
3. Journal of nanostructure in chemistry (springer publishers)
4. Nanochemistry (wiley publishers)
5. nptel.ac.in/courses/118104008/6 (Introduction to nanomaterials)
6. nptel.ac.in/courses/118104008/ (Nanostructures and nanomaterials)

Course Outcomes:

At the end of the course, students will be able to:

1. Students will learn the different synthetic methods of the nanomaterials.
2. To know the student Electronic, optical and magnetic properties of nanomaterials.
3. To acquire the knowledge various instrumental methods of analysis (TEM, EDS, SEM, DLS &AFM).
4. The students can come to know the carbon nanotubes, carbon nanofibers, nanostructured catalysts and organic nanosolar cells.
5. Students will learn usage of nanomaterials in the purification of water.

COS	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			1							
CO2	1		2	1								
CO3	1	2		2	1							
CO4	2		2	1								
CO5	1	2			1	2	1					

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.

Code: 80B19	POLYMER CHEMISTRY	L	T	P
Credits: 3	[OPEN ELECTIVE]	3	-	-

Prerequisites: NIL

Course Objectives:

The subject provides an introduction to polymer science along with the synthesis of macromolecules by step-growth and chain-growth polymerization. Compounding of polymers and different fabrications methods are discussed. Molecular weight determination of polymers is shown using gel permeation chromatography. An overview of biodegradable and conducting polymers is also given.

MODULE I: Introduction to Polymer Chemistry   [10 Periods]

Definitions-Origin, Monomers and its requirements - Broad classification of polymers- types based on structure (homo & copolymers), processing (thermo plastics & thermosetting plastics) and applications. Molecular force and chemical bonding in polymers - tacticity. Determination of molecular weight (MW)-methods for number average- weight average- PDI(poly dispersity index)-effect of polymerization on PDI. Distribution and processing of polymers using Tg& Tm.

MODULE II: Polymerization mechanism   [10 Periods]

Chain growth Polymerization – Addition Polymerization – Reaction Mechanism - Free Radical Reaction – Ionic Reaction – Coordination Polymerization – Ring – Opening Polymerization –Condensation (step) Polymerization – Degree of Polymerization–differences between addition and step growth polymerization. Polymerization techniques -bulk, solution, suspension, emulsion-advantages and disadvantages.

MODULE III: Compounding of Polymers & fabrication methods   [09 Periods]

A: Introduction-compounding of polymers and their functions, selection of additives (by function), improving/modifying the mechanical properties.

B: Fabrication of plastics by compression, injection, transfer, extrusion –moulding, blowing and thermoforming methods.

MODULE IV: Characterization techniques   [10 Periods]

Molecular mass by Gel permeation chromatography, Molecular structure by X-ray diffraction, Morphology of polymer using -Scanning Electron Microscopy, Thermal stability using Thermogravimetric analysis (TGA).

MODULE V: Biodegradable polymers and conducting polymers   [09 Periods]

Biodegradable polymers, types, examples: Polyhydroxy butyrate (PHB), Poly-Hydroxybutyrate-co-β-Hydroxyvalerate (PHBV), Polyglycolic acid (PGA), Polylactic acid (PLA), Poly (ε-caprolactone) (PCL). Applications of biodegradable polymers. Conducting polymers (poly aniline and poly acetylene)-types-properties-doping-applications.

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "**A text Book of Engineering Chemistry**",

DhanpatRai Publications, New Delhi, 12th Edition 2006.

2. S.S. Dara and S.S. Umare, "**A Text Book of Engineering Chemistry"**, S Chand Publications, New Delhi, 12th Edition 2010.

3. P. C. Hiemenz and T. P. Lodge. **"Polymer Chemistry**", 2nd edition, CRC Press, 2007.

4. F.W. Billmeyer, "**Text Book of Polymer Science"**, John Wiley & Sons, 4th Edition, 1996.

5. V.R. Gowariker, **"Polymer Science"**, New Age International Publisher, 2nd Edition, 2015.

REFERENCES:

1. B.Rama Devi, Ch.Venkata Ramana Reddy and Prasantha Rath, **"Text Book of Engineering chemistry"**, Cengage Learning India Pvt.Ltd,2016.

2. Prasanth Rath, **"Engineering Chemistry"**, Cengage Learning India Pvt.Ltd, 2015.

E- RESOURCES:

1. http://hysz.nju.edu.cn/wangxl/download-polymer/Polymer%20Chemistry%20(Carraher).pdf (polymer chemistry)
2. file:///C:/Users/Admin/Downloads/polymer-science-and-technology.pdf(polymer science and technology)
3. European polymer journal (Elsevier publishers)
4. Journal of polymer research (Springer publishers)
5. http://nptel.ac.in/courses/104105039/ (Polymer chemistry)
6. http://nptel.ac.in/courses/113105028/ (Polymers)

Course Outcomes:

At the end of the course, students will be able to:

1. Analyse different mechanisms of polymer formation and use this information in the synthesis of different polymers.
2. Evaluate the effect of factors such as polymer structure, molecular weight, branching and diluents on crystallinity.
3. Interpret experimental data and determine the structure of polymers by different techniques.
4. Assess the compounding of polymers & fabrication methods.
5. To know the student importance of biodegradable and conduction polymers.

COS	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		2	1							
CO2	2		1		2							
CO3		2	1	2	1							
CO4	2	1	2									
CO5	2	1		1	2		1					

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak